VOL. 14. NO. 10 Registered in U. S. Patent Office OCTOBER, 1916

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW.

$1.00 Per Year 99 JOHN STREET, NEW YORK 10 Cents Per Copy

A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

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Which ingot gives *more* castings —*less* waste?

TRADE MARK

The pitting at the top of the ingot in the smaller picture is due to impurities—iron, sulphur, aluminum, etc.

You've seen this drossy top form many times when oxides of the metals in the alloy cover the surface of a melt.

The smooth, clean top of the AJAX INGOT is due to absence of impurities, and their absence is the result of the manufacturing process—which is exclusively AJAX.

From your own foundry experience you know that the more impurities you have, the less reliable and uniform will be the castings output.

All AJAX PROCESS INGOTS—because of the exclusive process—are so nearly free from impurities that these are negligible. And the analyses are absolutely guaranteed in every case.

You should use AJAX INGOTS because the absence of impurities gives you more metal for your money, and the absolutely uniform, guaranteed analysis reduces foundry cost by increasing your output of acceptable castings.

The Ajax Metal Co.
Philadelphia and Birmingham, Ala.

BRANCH OFFICES:

New York, Boston, Pittsburgh, Washington, Chicago, St. Louis, San Francisco, Detroit

AJAX INGOTS PROCESS

THE METAL INDUSTRY

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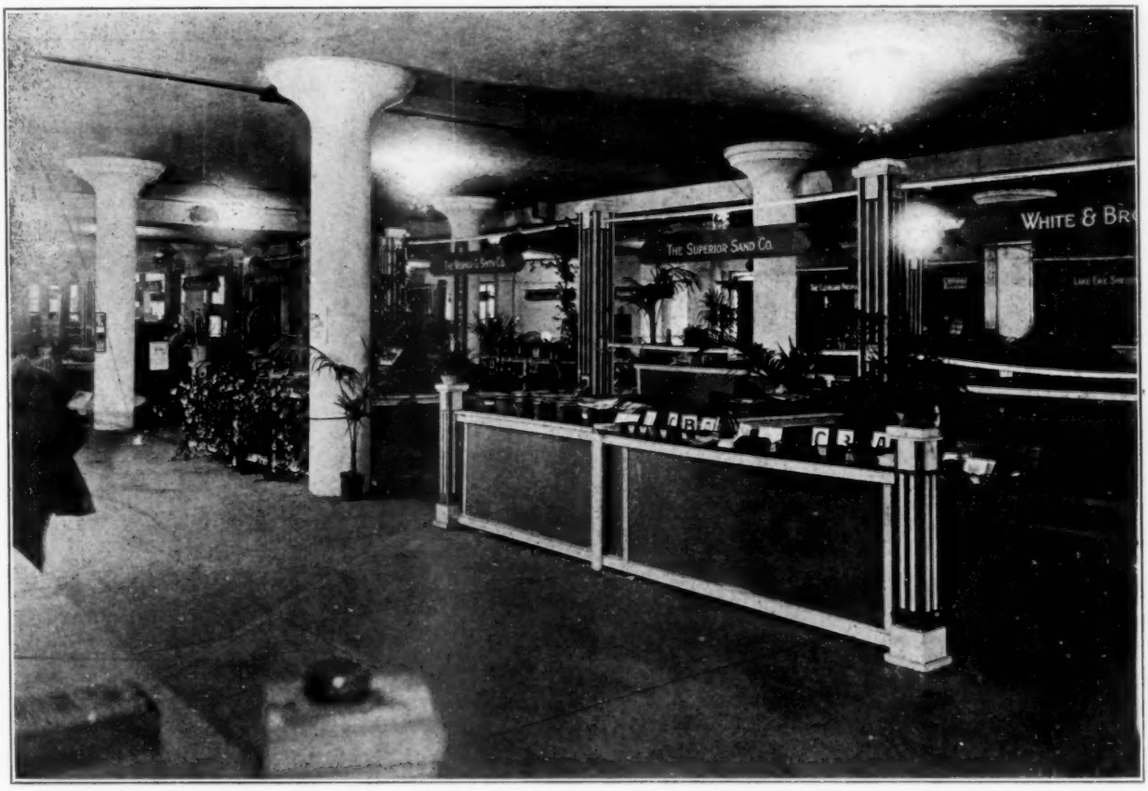
OLD SERIES Vol. 22. No. 10. | NEW YORK, OCTOBER, 1916. | NEW SERIES Vol. 14. No. 10.

FOUNDRYMEN'S CONVENTION

A CONDENSED REPORT OF THE ANNUAL MEETING OF FOUNDRYMEN AND EXHIBITION OF FOUNDRY APPARATUS AND SUPPLIES, HELD IN CLEVELAND, OHIO, SEPTEMBER 11 TO 16, 1916.

As foretold in the September issue of THE METAL INDUSTRY, the Cleveland convention surpassed all preceding ones, both in the attendance at the various sessions of the associations convening and in the number of exhibitors and visitors registered at the exhibition held in the Wigmore Coliseum.



A VIEW OF THE EXHIBITS IN THE MAIN HALL AT THE FOUNDRYMEN'S EXHIBITION, CLEVELAND, OHIO, SEPTEMBER 11 TO 16, 1916.

The American Institute of Metals held a record-breaking meeting and proved by Secretary Corse's report, published at the end of this article, that the institute was more than holding its own, in spite of the increase of dues which went into effect this past year.

THE SESSIONS.

The opening session, held Monday, September 11, at 10 a. m., in the Hotel Statler, was a joint one with the American Foundrymen's Association, and was given over to an address of welcome by Hon. Harry L. Davis, mayor of Cleveland; response by Alfred C. Howell, of Nashville, Tenn., past president of the American Foundrymen's Association, and annual addresses of various officers, including that of Jesse L. Jones, president of the American Institute of Metals, which was as follows:

PRESIDENT JONES' ADDRESS.

As a country grows older and becomes thickly populated, its societies seem to multiply in number, and their plan of organization is more complex and elaborate.

China is the oldest of all countries, and it is said to have more societies to the square mile than any other country. The Chinaman is the greatest of all "Jiners" and he will organize a society at the slightest provocation. For instance, if he gets the idea that the extermination of flies is a good thing, he will get together his friends and neighbors and form a "Tong," or society for swatting flies. A new organization, whether there is any need

for it or not, is always hailed with the greatest enthusiasm.

In recent years the United States has not been far behind China in regard to the launching of new societies. Unusual activity has prevailed in this respect in manufacturing and technical circles. Scores of technical societies have been formed in the last decade and at the present time their activities frequently overlap. The dues and fees of members in these societies have in nearly every case been doubled or largely increased within the past few years.

In England a similar condition exists and the present war has forced the consideration of more economical and efficient administration of all technical and scientific bodies. It has been proposed to combine all such organizations into one general society, composed of sections, each devoted to some specific work. Publication expenses, dues, etc., would be reduced by this plan and there would be no duplication of work. About seventy societies are to be included in this consolidation, according to the plans of its advocates.

It would give me pleasure to see the American Institute of Metals and the American Foundrymen's Association inaugurate in the United States a movement to combine into one body all its leading technical and scientific societies. We realize with thankful hearts that grim-visaged war has not forced any such plan upon us, but we also cannot but realize that our present methods of administration of technical work are very faulty.

The happy plan of a joint convention, which has been followed for a number of years by the American Institute of Metals and the American Foundrymen's Association, with such mutually beneficial results, could be made the basis of a movement looking toward the amalgamation of all the leading societies in the United States. A joint convention of our two societies in 1917 with the American Society for Testing Materials, American Electro-Chemical Society, American Chemical Society, American Institute of Mining Engineers, and similar societies, with this object in view, is suggested. If it led to nothing definite as far as a central organization is concerned, it would undoubtedly result in a closer co-operation and a greater community of interests on the part of each society that attended such a joint convention.

ANOTHER VIEW OF THE MAIN HALL AT THE CLEVELAND, OHIO EXHIBITION OF FOUNDRY APPARATUS.

TUESDAY, SEPTEMBER 12, 1916.

The second meeting was also a joint session, and papers interesting to both societies were presented and discussed. Among these papers were "NON-FERROUS METALS," by C. C. Chase, Modjeski and Angier, Chicago, Ill.

"NON-FERROUS METALS," by R. R. Clarke, Pennsylvania Lines West, North Side, Pittsburgh.

"WASTE FOUNDRY SAND," by H. B. Swan, Cadillac Motor Car Company, Detroit, and H. M. Lane, consulting engineer, Detroit.

"THE SIGNIFICANCE OF THE FIRE WASTE," by Franklin H. Wentworth, secretary, National Fire Protection Association, Boston.

"WHAT THE PRATT INSTITUTE HAS DONE, IS DOING AND HOPES TO DO, IN THE TRAINING OF MEN FOR THE FOUNDRY INDUSTRY," by Samuel S. Edmands, Pratt Institute, Brooklyn.

"ANALYZING FOUNDRY OPERATIONS AS A BASIS FOR IMPROVEMENT IN SHOP CONDITIONS," by R. E. Kennedy, University of Illinois, Urbana, Ill.

"FOUNDRY WORK AT THE UNIVERSITY OF NEBRASKA," by John Grenman, University of Nebraska, Lincoln, Neb.

WEDNESDAY, SEPTEMBER 13, 1916.

This session was devoted to practical foundry practice and was remarkable for the attendance. The meeting room was filled to capacity and, as G. H. Clamer remarked, was the first meeting in the history of the Institute where "standing room" only was achieved. The papers read and discussed show a wide range in foundry practice and their discussion was spirited and greatly appreciated. The papers were as follows:

"TWENTY-FIVE YEARS' EXPERIENCE IN THE BRASS FOUNDRY," by E. A. Barnes, Fort Wayne Electric Company, Fort Wayne, Ind.

"EVOLUTION OF THE DIE CASTING PROCESS," by Charles Pack, Doehler Die Casting Company, Brooklyn, N. Y.

"HOW A LARGE MANUFACTURING CONCERN DISPOSES

OF ITS OLD METAL," by J. M. Bateman, Western Electric Company, Cleveland, O.

"THE RECLAMATION OF BRASS ASHES," by Arthur F. Taggart, Hammond Laboratory, Yale University, New Haven, Conn.

"THE SMALL LEAKS OF A BRASS FOUNDRY," by Charles T. Bragg, Ohio Brass Company, Mansfield, O.

"THE APPLICATION OF THE OXY-ACETYLENE WELDING PROCESS IN THE REPAIR OF DEFECTIVE NON-FERROUS CASTINGS," by S. W. Miller, Rochester Welding Company, Rochester, N. Y.

"ALLOYS TO WITHSTAND INTERNAL AIR PRESSURE," by S. D. Sleeth, Westinghouse Air Brake Company, Wilmerding, Pa.

"MAKING THIN-WALLED CASTINGS," by R. S. B. Wallace, National Cash Register Company, Dayton, O.

THURSDAY, SEPTEMBER 14, 1916.

This session was devoted to heat, treatment, corrosion, etc. The papers were as follows:

"DETERIORATION OF MUNTZ METAL," by H. S. Rawdon, United States Bureau of Standards, Washington, D. C.

"THE INITIAL STRESS PRODUCED BY THE BURNING-IN OF MANGANESE BRONZE," by Paul D. Merica and C. P. Karr, United States Bureau of Standards, Washington, D. C.

"A CURIOUS CASE OF CORROSION OF TINNED SHEET COPPER," by Paul D. Merica, United States Bureau of Standards, Washington, D. C.

"NOTES ON THE OCCURRENCE AND SIGNIFICANCE OF TWINNED CRYSTALS IN ELECTROLYTIC COPPER," by H. S. Rawdon, United States Bureau of Standards, Washington, D. C.

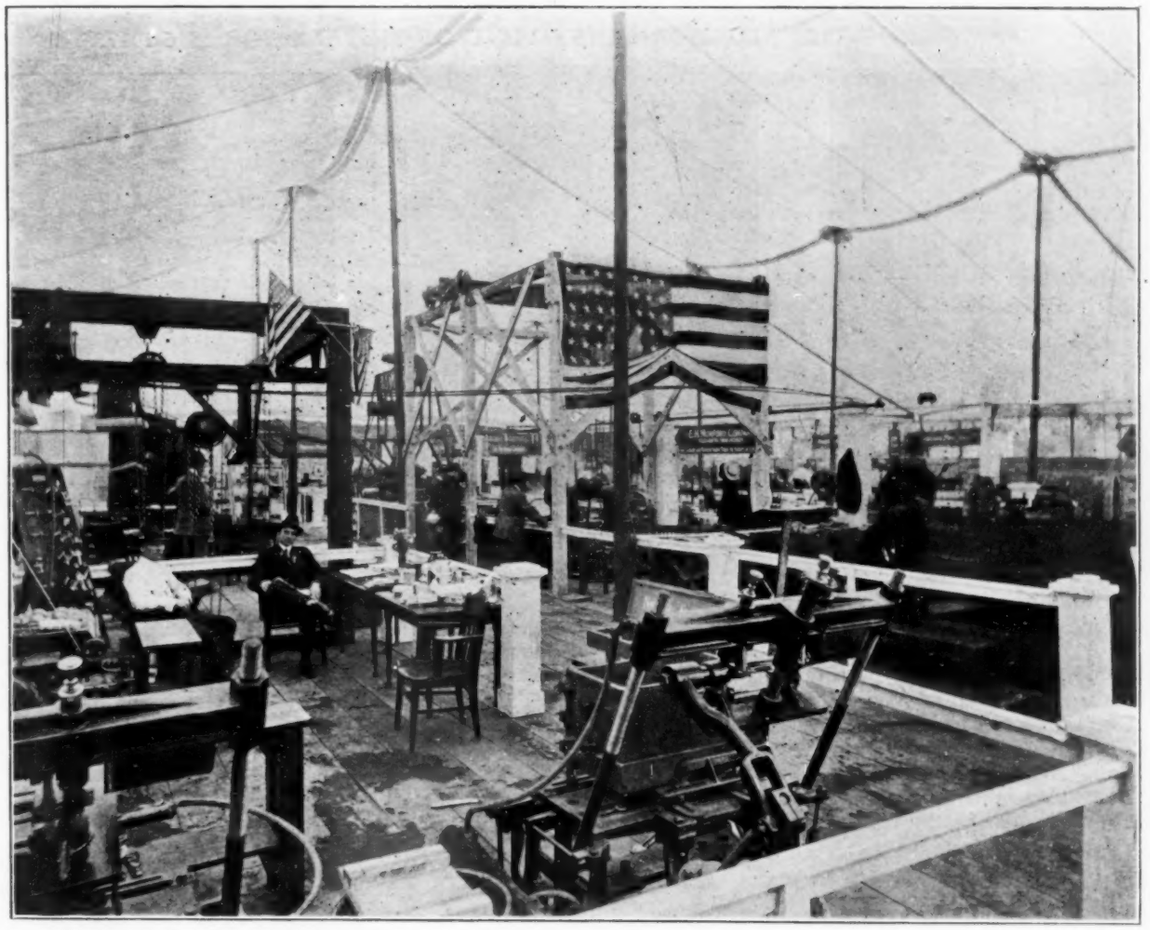
"THE ANNEALING PROPERTIES OF COPPER," by G. V. Caesar and G. C. Gerner, Hammond Laboratory, Yale University, New Haven, Conn.

"SOME NOTES ON THE TESTING OF BRASSES AND BRONZES," by Ernest Jonson, engineer inspector, New York Board of Water Supply.

FRIDAY, SEPTEMBER 15, 1916.

A session devoted to the reading of papers on physical tests, metallography, etc. These papers were as follows:

"ALUMINUM CASTINGS AND FORGINGS," by P. E. McKinney, United States Navy Yard, Washington, D. C.



A VIEW OF THE TENT ANNEX AT THE CLEVELAND EXHIBITION. HERE WERE SHOWN THE MOVING EXHIBITS.

"COPPER-ALUMINUM-IRON ALLOYS," by W. M. Corse, Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.

"PHYSICAL TESTS ON COMMON HIGH BRASS TAKEN PARALLEL AND AT RIGHT ANGLES TO THE DIRECTION OF ROLLING," by William B. Price and Philip Davidson, Scovill Manufacturing Company, Waterbury, Conn.

"SEASONING CRACKS AND THE SELF-ANNEALING OF BRASS," by W. Arthur, Frankford Arsenal, Frankford, Philadelphia.

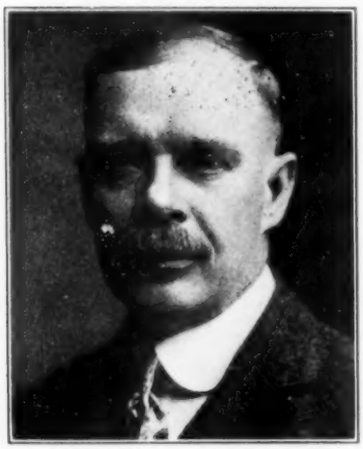
"CO-OPERATION WITH THE METAL INDUSTRIES IN METALLOGRAPHIC WORK," by C. H. Mathewson, director, Hammond Laboratory, Yale University, New Haven, Conn.

ELECTION OF OFFICERS.

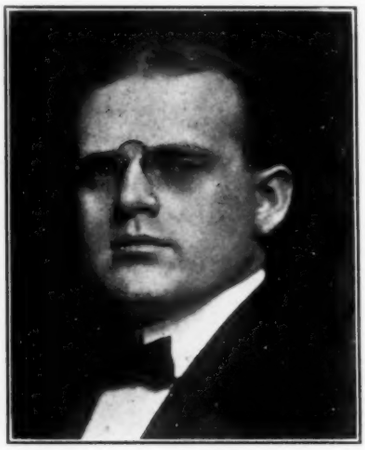
During a business session held at the closing meeting Friday, Jesse L. Jones, Westinghouse Electric & Manufacturing Company, East Pittsburgh, was re-elected president, and W. M. Corse, Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., was re-elected secretary. George C. Stone, New Jersey Zinc Company, was elected first vice-president, and other vice-presidents were elected as follows: R. S. B. Wallace, National Cash Register Company, Dayton, Ohio; William B. Price, Scovill Manufacturing Company, Waterbury, Conn.; G. K. Burgess, United States Bureau of Standards; DeCourcy Browne, Goldschmidt Thermit Company, New York; Harold J. Roast, James Robinson Company, Montreal; G. P. Salter, Ohio Brass Company, Mansfield, Ohio; F. H. Schutz, H. B. Mueller Manufacturing Company, Decatur, Ill.; W. A. Cowan, National Lead Company, and H. S. Gulick, Moore-Jones Brass & Metal Company, East St. Louis, Mo.

The officers were selected by a nominating committee appointed at the Wednesday session, consisting of N. K. B. Patch, Lumen Bearing Company, Buffalo, N. Y.; G. H. Clamer, Ajax Metal Company, Philadelphia, and L. W. Olson, Ohio Brass Company, Mansfield, Ohio. The ticket named was unanimously elected. Mr. Cowan was appointed chairman of the committee on papers for the ensuing year.

OFFICERS OF THE AMERICAN INSTITUTE OF METALS FOR 1916-1917.



JESSE L. JONES, President.



W. M. CORSE, Secretary and Treasurer.

C. C. HOYT, Exhibition Manager.

SECRETARY'S REPORT.

Our membership list since the increase in dues has been slightly decreased. The number of active members on July 1, 1916, was 156, associate members 87, corporation members 19. As corporation members are entitled to three active memberships this makes a total active membership of 213 or an entire membership of 300. The membership last year was 314. New members have been taken in since July 1 to the number of 31 and they are still coming in so it seems that we will have 340 in all very soon.

Volume IX of the Transactions was the best book that we have so far issued and is a distinct improvement over previous issues, viz: the use of coated paper for half tone cuts. The volume again reflects the large amount of work on the part of the papers committee of which J. L. Jones was chairman.

The Institute is to be congratulated on having among its members men who are able to get together material for transactions such as we have had. During the year an official pin has been adopted which is in the shape of a small gold ingot with the letters A. I. M. on the faces of the mounts. The pin is distinctive and sells for $1.00 for gold filled and $3.50 for solid gold. The usual meetings of the Advisory Committee with the Bureau of Standards have been held during the year, one in October and one in April. The report of these meetings will be found in the transactions when published.

The following is the standing of the books on July 1, 1916:

STATEMENT OF AMERICAN INSTITUTE OF METALS

Receipts.

	July 1, 1916	
Balance, July 1, 1915		$ 33.70
Dues for 1915-1916	$2,526.50	
Cash received for volumes	250.00	
Proceeds from convention 1915	343.85	
Cash for emblems	37.00	
Interest	4.00	3,161.33
		$3,195.03

Disbursements.

Insurance premium	$28.90	
Telegrams, express, postage, etc	90.65	
Expense of programme committee	51.28	
Stenographic report of Atlantic City Meeting and Advisory Committee Meetings	140.00	
Salary for editing Volume IX	100.00	
Stenographer's salary	305.00	
Secretary's salary	600.00	
Emblems, cost of	111.58	
Bulletins, advance papers—mailing, etc	693.14	
Volume IX, binding, labels, cartons, etc	628.20	
Dues refunded	10.00	
Printing, stationery, etc	96.16	
	$2,862.62	
Cash on hand, July 1, 1916	332.41	
		$3,195.03

NO MERGER WITH FOUNDRYMEN'S ASSOCIATION.

The Institute took formal action declining to merge with the American Foundrymen's Association, deciding that it is to its interest to remain an independent organization. A report of a special committee on a possible consolidation, with a view of effecting economy in the operation of the Institute was made by Secretary Corse. He said that the executive committee felt that while the two organizations have much in common, there are some members of the Institute, such as men in rolling mills and refining plants, who are not interested in foundry problems and that it would be unwise to bring about the merger. The Institute should be a place for a practical brass foundryman, as well as for

the metallurgist, and he felt that the metallurgical side of the brass foundry is more important than that of the iron foundry because the brass foundry has to do with fifty metals, while the iron foundry has only the one metal. The growing value of the Institute was shown by the presentation of more valuable papers, and he said the executive committee wished to avoid any danger that might result from a consolidation. George C. Stone, who acted as chairman during this session, said the executive committee was unanimous in its decision to have the Institute remain as an independent organization. R. R. Clarke observed that the sessions this year more than ever showed that the Institute is bringing the practical and technical men together, and that they are co-operating more closely. C. P. Karr suggested that efforts be made to get more of the prominent metallurgists, including college professors, to join the Institute and prepare papers. Mr. Corse replied that frequently papers were secured from prominent metallurgists who are not members.

The action of the executive committee in favor of remaining a separate body was formally approved.

Secretary Corse announced that Dr. Burgess had suggested that the Bureau of Standards act as a clearing house for information regarding the properties of alloys and had requested the Institute to aid in collecting this information. In connection with this he said that the advisory committee would hold a meeting in Washington this fall, probably in October. The members were told that if they can furnish information regarding some of the properties of alloys, the Bureau of Standards, with the instruments at its disposal, can provide the remainder. Mr. Kerr stated that hydrostatic tests are of as much importance as others, the hydrostatic pressure being of particular interest to makers of plumbing fixtures, and that these tests should be made. P. E. McKinney thought steps should be taken to standardize hydrostatic tests, there being nothing at present on which to base these tests. It is decided that this is a subject that should be handled by the American Society for Testing Materials, and the secretary was instructed to communicate with that society with a request that it formulate the hydrostatic standards.

AMERICAN FOUNDRYMEN'S ASSOCIATION.

The new officers elected by this association for 1916-17 were as follows: J. P. Pero, president; Benjamin D. Fuller, senior vice-president, and A. O. Backert was re-elected secretary-treasurer. The list of directors includes, in addition to past presidents and present vice-presidents, representatives of the exhibit function of the association, and is as follows: R. A. Bull, Granite City, Ill.; C. E. Hoyt, Chicago, Ill.; H. B. Swan, Detroit, Mich.; B. D. Fuller, Cleveland, Ohio; Stanley G. Flagg, 3rd, Philadelphia, Pa.; S. B. Chadsey, Toronto, Canada; Alexander T. Drysdale, Burlington, N. J.; Alfred E. Howell, Nashville, Tenn.; J. P. Pero, East St. Louis, Ill.; S. T. Johnston, Chicago, Ill.; A. O. Backert, Cleveland, Ohio; H. S. Covey, Cleveland, Ohio; Major Joseph T. Speer, Pittsburgh, Pa.; V. E. Minich, New York; H. A. Carpenter, Providence, R. I., and W. A. Janssen, Davenport, Ia.

THE EXHIBITION.

The exhibition of foundry apparatus and supplies was pronounced the most successful ever held, both in point of attendance and in number of sales made by the exhibitors, as well as in the character of the exhibits, as described in the following pages. While other exhibits have drawn as large an attendance, none have been witnessed by so many men connected with foundries and directly interested in the equipment shown. The exhibitors report a very gratifying number of orders. The great interest taken in foundry machinery is attributed in some degree to the present prosperity of the foundry industry, also to the scarcity and high price of labor, causing foundry managers to add labor-saving equipment wherever possible. The exhibit was kept open during the day, starting with Tuesday and closing Saturday afternoon.

EXHIBITORS AND THE PRODUCTS DISPLAYED

Alexander Bros. Lumber Company, pattern and flask lumber specialists, Cleveland, Ohio.—Represented by H. L. Spitler and M. F. Fitzgerald.

Ajax Metal Company, Philadelphia, Pa.—Ajax process ingot and babbitt metals. Represented by G. H. Clamer, C. F. Hopkins, F. M. Willeson, C. F. McRae and L. E. Purnell.

Amalgamated Machinery Corporation, Chicago, Ill.—Machine for boring and finishing large high-explosive shells. Represented by N. A. Mears.

American Foundry Equipment Company and Sand Mixing Machine Company, Combined, New York.—New design self-propelled automatic sand cutter for cutting and tempering sand for floor molders where required; automatic sand blast tumbling barrels and rotary table sand blast room. Represented by H. L. Wadsworth, Hutton H. Haley, John B. Alexander, John Bradley, V. E. Minich and others.

American Gum Products Company, New York.—Samples of core binder and cores. Represented by G. I. Lindsay, W. E. Baird, J. F. Gaffney and R. H. Mills.

American Molding Machine Company, Terre Haute, Ind.

Arcade Mfg. Company, Freeport, Ill.—Power roll-over jolt, combination jolt squeezer, plain jolter, machine for making piston castings and a core jolter. Represented by E. H. Morgan, Charles Morgan, L. L. Munn, Henry Tscherning, R. E. Turnbull, August Christen and G. D. Wolfley.

Armstrong Cork Company, Pittsburgh, Pa.—Brick for insulation of furnaces and kindred high-temperature equipment, high-pressure covering for steam lines, boilers, etc., and cork covering for service lines and building equipment. An electric furnace will be in operation to illustrate its insulating brick. Represented by E. C. Lloyd and P. W. Lamson.

E. C. Atkins & Company, Inc., Indianapolis, Ind.—Line of saws, including circular metal-cutting, metal-cutting band, hacksaw blades and frames, saw-fitting tools and friction disks. Demonstration of power hacksaw machine and hacksaw blades. Represented by Thomas H. Endicott, T. A. Carroll and A. Mertz.

Ayer & Lord Tie Company, Chicago, Ill.—Section of 3-in. interior creosoted wood block floor. Represented by A. H. Noyes, W. H. Blythe, F. W. Maechler, B. S. McConnell, S. C. Conway and R. C. Inslee.

B. & B. Mfg. Company, Indianapolis, Ind.—Stationary power squeezer with power unit; portable power squeezer with power unit and stationary hand power and squeezer machine of new design. Represented by the Cleveland Power Transmission Company.

Beighlee Electric Company, Inc., Cleveland, Ohio.—Indicating and recording pyrometer equipment of the compensating cold-junction type.

Berkshire Mfg. Company, Cleveland, Ohio.—Automatic molding machine, hand and air squeezer machines, jolt squeezer machines, vibrators, etc. Represented by W. A. Price, C. L. V. Evans, W. D. Fraser, F. Hulec and G. L. Cannon.

Charles H. Besly & Company, Chicago, Ill.—Pattern makers' disk grinding machine and disk grinding machine, both motor-driven; wide-face ring wheel grinding machine and vertical spindle disk grinding machine, both belt-driven. Also abrasive disks and various accessories for its equipment. Represented by Edward P. Welles, Charles A. Knill, Ralph W. Young, Leo E. Jacobs and George Klemp.

S. Birkenstein & Sons, Chicago, Ill.—Special metal products for brass and aluminum foundries and castings from them. Represented by Harry Birkenstein, Lee Kahn, M. Schero, H. Goldstein and Charles Raphael.

Blystone Mfg. Company, Cambridge Springs, Pa.—Low standard motor-driven ore sand mixers with screen attached and

equipped with power dump. Represented by W. J. Pees and Luther G. Conroe.

Brown Hoisting Machinery Company, Cleveland, Ohio.—Tramrail equipment with switch, turntable, I-beam trolley and hoists; also overhead hand traveling crane with trolley and hoist. Represented by A. R. Leeds and F. D. Johnson.

Brown Specialty Machinery Company, Chicago, Ill.—Three styles of hammer core machines, electric duplex shaker, pneumatic duplex shaker, revolving barrel sand blast machine and three sizes of rotary table machines. Represented by John Laycock, J. E. Sweet and Elmer A. Rich, Jr.

Buckeye Products Company, Cincinnati, Ohio.

Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxite wheels for foundry use, Carborundum fire sand and silicon metal. Represented by George R. Rayner, G. T. Eastabrook, W. U. Parrott, C. W. Bardon, W. Walters, C. D. Sargent, O. C. Dobson, J. P. McCann, T. B. Woodrow and C. E. Hawke.

Cataract Refining & Mfg. Company, Buffalo, N. Y.—Core oils and compounds, partings, cutting lubricants, compounds and oils, with samples of cores, castings, made with Cataract material, etc. Bolt machine will be operated using company's cutting lubricants. Represented by J. Purvis, Jr., J. E. Chism, E. P. Hughes, D. L. Baldsin, A. A. Schaefer, A. C. Breese, R. M. Hitch, W. E. Williams, F. N. Tweedy, E. H. Coburn, B. Deacon, C. W. Seibold, H. C. Newton, T. E. Kenefick and H. C. Hutchins.

Champion Foundry Machinery Company, Chicago, Ill.—Electric sand riddles in operation. Represented by H. O. Magnuson, William Magnuson and A. Magnuson.

Chicago Eye Shield Company, Chicago, Ill.—Safety goggles and lenses for eliminating violet rays. Represented by Robert Malcom and Dr. Brennecke.

Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic chipping hammers, rammers, hoists, compressors, drills, casting cleaners, electric drills and grinders. Represented by A. C. Andresen, T. D. Slingman, T. G. Smallwood, J. G. Osgood and others.

Cincinnati Pulley Machinery Company, Cincinnati, Ohio.—Three motor-driven machines in operation, two single-spindle and one two-spindle with pump and lubricant connection; three machines not in operation, two single-spindle and one single-spindle with power feed and round column. Represented by L. B. Patterson, J. G. Hey, J. F. Mirrielles and C. K. Cairns.

Charles J. Clark, Chicago, Ill.—Operating exhibit, showing use of blast meter and line of instruments for measuring volume and pressure of blast to cupolas, malleable and other industrial furnaces. Represented by Charles J. Clark.

Cleveland Blow Pipe & Mfg. Company, Cleveland, Ohio.—Dust collecting system for emery and grinding wheels, consisting of motor-driven exhaust fans, dust trap and piping; also sheet-metal shower bath installation. Edward Coney represented the company.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Air tools, including riveting and chipping hammers, drills, sand rammers, core breakers, valve grinders, air hose couplings, etc. A riveting hammer will be shown which embraces features not heretofore used in such hammers.

Cleveland Wire Spring Company, Cleveland, Ohio.—Steel barrels, boxes and waste cans. Represented by J. W. Campbell, C. H. Erickson, J. Marshall and C. C. Klingman.

Thomas E. Coale Lumber Company, Philadelphia, Pa.—Michigan soft cork white pine and display of California sugar pine pattern lumber. Represented by Thomas E. Coale, E. C. Anderson and A. Warren Anderson.

Curtis Pneumatic Machinery Company, New York.—Controlled splash oiling system air compressor with adjustable sight-feed cylinder lubricating feature, new type reciprocating vertical air hoist for washing and pickling operations, single I-beam crane for foundry and machine shop, closed hoppers sand blast, small compressors, single I-beam trolley and illustrations of representative installations and of devices not exhibited. Represented by L. C. Blake and the staff of the Charles E. Stamp Company.

Dalton Adding Machine Company, Cincinnati, Ohio.—Adding, listing and calculating machines, both hand and motor-driven. Represented by R. Lancaster Smith.

NEW VICE PRESIDENTS OF THE AMERICAN INSTITUTE OF METALS FOR 1916-1917.

H. J. ROAST,
James Robertson Co., Ltd., Montreal, Que.

J. P. SALTER,
Ohio Brass Company, Mansfield, Ohio.

W. A. COWAN,
National Lead Company, New York.

Davenport Machine & Foundry Company, foundry molding machines, Davenport, Iowa.—Represented by John T. Anderson and Carl Falk.

Davis-Bournonville Company, Jersey City, N. J.—Oxy-aectylene and oxy-hydrogen welding and cutting apparatus, with working exhibit, showing application in foundry work, general repairs and manufacturing. Represented by Hugh H. Dyar, William H. Joyce, Alex Blazer and Messrs. Lindholm and Gill.

William Demmler Bros., Kewanee, Ill.

Joseph Dixon Crucible Company, Jersey City, N. J.—Graphite products including crucibles, stoppers, nozzles, sleeves, phosphorizers, stirrers, foundry facings, etc. Represented by Dudley A. Johnson, H. C. Sorenson, F. R. Brandon and J. A. Biel.

Electric Controller & Mfg. Company, Cleveland, Ohio.—Lantern slides of its products. Represented by F. R. Fishback and M. Converse.

Excelsior Tool & Machine Company, East St. Louis, Ill.—Polishing machines, one in operation on stove top, the other in operation polishing pipe; also polishing and buffing lathe in operaton. Represented by T. F. Philippi and assistant.

Federal Foundry Supply Company, Cleveland, Ohio.—Jolt and squeeze machines, plain squeezers and line of jolt machines and foundry supplies. Represented by W. J. Adams, R. Ditty, E. Kaye, I. D. Adams, C. Collins, John Bayer and L. H. Heyl.

Felt & Tarrant Mfg. Company, Chicago, Ill.—Demonstration of controlled-key duplex comptometer adding and calculating machine as applied to book work, billing, estimating, pro-rating,

cost calculations, etc. Represented by J. C. Nevins, W. F. Sims, J. G. Luniak, W. G. Resch and Miss Irma Urban.

Foundry Equipment Company, Cleveland, Ohio.—Stationary core ovens of roller drawer type, brass and aluminum furnaces, sprue cutters, squeezers, crucible lever lifters, core makers' benches and oil burners. Represented by Julius Tuteur, F. A. Coleman and C. A. Barnett.

Gardner Machine Company, Beloit, Wis.—Grinders in sizes ranging from 12-in. to 53-in., both belt and motor-driven; pattern-makers' disk grinders and ball bearing polishing lathes, several of which will be in operation; accessories and parts. Represented by L. W. Thompson, F. E. Gardner, W. B. Leishman, J. M. Gardner, E. L. Beisel, V. E. Breyley, W. L. Townsend and D. C. Graves.

General Electric Company, Schnectady, N. Y.—Line of control devices, switchboards, panels, motor and a 300-ampere portable arc-welding outfit. Represented by J. W. Ham, J. A. Seede, J. Eaton, R. E. Wooley, O. W. Buddington, L. W. Shugg, W. J. Hanley, G. E. Guy and J. A. Boers.

Gibb Instrument Company, Pittsburg, Pa.—I-Rite pyrometer. Represented by W. H. Gibb and J. R. Brueckner.

Gisholt Machine Company, Madison, Wis.—Display of the periodograph for obtaining time records in operation. Represented by Ellis F. Muther, W. J. Hannum, R. M. Carter, Howard E. Preston and Charles B. Carr.

Goldschmidt-Thermit Company, New York.—Line of carbon-free metals; 50 per cent. ferrosilicon; samples of Thermit welds on heavy sections of wrought iron and steel, with illustrations covering the process adapted to repairs on steel mill equipment, and a line of Thermit and Titanium Thermit cans for use in fountry ladles. Demonstrations of pipe welding. Represented by D. B. Browne, H. G. Spilsbury, J. G. McCarty, H. D. Kelly and E. B. Bloom.

Gordon Sand Company, Conneaut, Ohio.—Reception booth. Represented by F. E. Gordon, U. E. Kanavel, W. R. Thompson and H. A. Keener.

Graceton Coke Company, Graceton, Pa.—Specimens of foundry coke.

Great Western Mfg. Company, Leavenworth, Kan.—Gyratory foundry riddle, gyratory foundry riddle with no-dump sieve for continuous riddling, and similar riddle with large sieve for contractors' use. Represented by F. A. Pickett and George W. Combs.

F. A. Hardy & Company, Chicago, Ill.—Safety devices, including eyeglasses, goggles, respirators and helmets. Represented by C. S. Wells and W. B. Gosman.

Benjamin Harris & Company, Chicago, Ill.—Various grades of ingot brass and castings made therefrom. Represented by L. Goldman, N. Harris and O. Harris.

Hauck Mfg. Company, Brooklyn, N. Y.—Compressed air and hand pump cupola lighters, skindrying outfits, kerosene torches, core oven burners, ladle heaters, rivet forges, blacksmith and brazing forge and aluminum melting furnaces. Represented by A. Busch Hauck and A. P. Link.

Hayward Company, New York.—An operating exhibit will be made of electric motor clam shell buckets. There will also be shown clam shell buckets of other types, orange peel buckets and drag scraper buckets. Representatives: H. S. Atkinson, production engineer; C. F. Hutchings and H. M. Davison, sales engineers.

Herman Pneumatic Machine Company, Zelienople, Pa.—Small type jarring machine. Represented by A. M. Frauenheim, H. T. Frauenheim, Alfred Herman, Robert Ringle, Andrew Rodgers, R. P. Morgan, Robert Walker and Thomas Kaveny.

Herold Bros. Company, Cleveland, Ohio.

Hill-Brunner Foundry Supply Company, Cincinnati, Ohio.—Reception booth. Represented by John Hill, Bruce Hill, Fred J. Brunner.

Hill & Griffiths Company, Cincinnati, Ohio.

Hoevel Mfg. Corporation, New York.—Catalogs. Represented by H. F. Hoevel, F. W. Weiss and L. B. Passmore.

Holland Core Oil Company, Chicago, Ill.

Herman A. Holz, New York.—Portable apparatus for the determination of the Brinell hardness of metals and metal products, independent of their dimensions, shape, etc. Represented by William O. Little.

Imperial Brass Mfg. Company, Chicago, Ill.—Oxy-acetylene and oxy-hydrogen welding, cutting and decarbonizing equipment. Represented by F. McNellis, Charles E. Young, J. Meskan and J. F. Schroeter.

Ingersoll-Rand Company, New York.—Bench and floor types of pneumatic sand rammers, ½ to 5-ton air motor hoists, complete line of chipping, calking and scaling hammers, core breaker, pneumatic grinder, reversible and non-reversible drills, close-quarter drills, riveting hammers with and without safety retainer, jam-riveters, holdêr-ons for backing up rivets, chipping hammers, pneumatic core-breaking hammer, and 12 and 7½ x 12 duplex air compressor, short belt and motor-driven, in operation running exhibits of pneumatic machinery. Represented by W. A. Armstrong, George A. Gallinger, Walter A. Johnson, J. E. Kemmerling and George C. Williams.

International Molding Machine, Chicago, Ill.—Represented by Edward A. Pridmore, W. W. Miller, J. W. Dopp and F. W. Hamel.

Interstate Sand Company, Zanesville, Ohio.

Jamison Coal & Coke Company, Pittsburgh, Pa.

Jennison-Wright Company, Toledo, Ohio.—Samples of Kreolite wood blocks and structural timbers, showing types of floor blocks designed for machine shops, foundries, pickling rooms, annealing rooms, forge shops, driveways, loading platforms, etc. Represented by A. W. Cobley, H. G. Jennison, W. E. Wright, F. W. Cherrington, E. M. Humphrey and H. P. Consaul.

Charles C. Kawin, Chicago, Ill.—Represented by Charles C. Kawin, John J. Nellis, J. H. Hopp and R. J. Courtney.

Julius King Optical Company, Chicago, Ill.—Line of safety eye protectors, welding helmets and sand blast helmets. Represented by W. G. King, J. J. Duffy, A. G. Larson and Edmond Harold.

Lake Erie Smelting & Refining Company, Cleveland, Ohio.

Lakewood Engineering Company, Cleveland, Ohio.

H. M. Lane Company, Detroit, Michigan.—Represented by H. M. Lane and two others of the company.

Lehigh Coke Company, South Bethlehem, Pa.—Samples of foundry cokes and by-products and photographs of the company's plant. Represented by D. A. Barkley and Robert McDonald.

Lees Bradner Company, Cleveland, Ohio.

Life Saving Devices Company, Chicago, Ill.

Lincoln-Electric Company, Cleveland, Ohio.—A 300-amp. arc welder. Represented by Robert E. Kinkead.

Lucas Machine Tool Company, Cleveland, Ohio.—Special 50-ton power forcing press, adapted for straightening heavy malleable-iron castings. Represented by J. A. Leighton, Jr., and F. P. Sprague.

David Lupton's Sons Company, Philadelphia, Pa.—Steel sash of counter-balanced type and continuous sash with operating device; also photographs and drawings of applications to foundry lighting and ventilation with photographs of installations. Represented by Clark P. Pond, C. F. P. Buckwalter and William Pfielder.

J. S. McCormick Company, Pittsburgh, Pa.—Pan grinder and mixer, gyratory motor-driven riddle, core oven plates and foundry supplies and facings. Represented by J. S. McCormick, T. E. Malone, S. R. Costley and A. T. Richardson.

MacLeod Company, Cincinnati, Ohio.—Sand blast barrels, sand blast machine, dust arrester, portable oil burners and oxy-acetylene welding and cutting apparatus. Represented by Walter MacLeod, O. P. Gwinner and Gus Schmidt.

Mahr Mfg. Company, Minneapolis, Minn.—Portable foundry torches and portable oil-burning rivet forge. Represented by J. A. Mahr, F. N. Brooker and F. A. Davis.

Malleable Iron Fittings Company, Branford, Conn.—Line of vibrators from ⅜ in. to 2 in., new line of valves, fittings and clamps for attaching vibrators to molding machines. Represented by G. B. Pickop and J. C. Page.

Manitowoc Electric Implement Company, Manitowoc, Wis.—Electric vibrators for alternating current and direct current. Represented by Frank Brixius and Rude Stockinger.

Michigan Smelting & Refining Company, Detroit, Mich.—Specimens of ingot brass and finished brass products, non-ferrous ingot metals and samples of lead pipe, solders, babbitt metals, etc. Represented by Joseph Sillman, C. O. Patch, Henry Levitt, A. J. Hall, W. J. Schweitzer, A. J. Oates, H. D. LeBel, J. D. LeBel, H. E. Berliner, R. H. Evans and G. W. Larissy.

Midland Machine Company, Detroit, Mich.—Jolt roll-over pattern drawing machine with special car for taking molds out on

floor, and hand roll-over machine. Represented by G. L. Grimes, E. L. Grimes, L. V. Grimes and C. J. Skeffington.

Moldar Company, Maspeth, N. Y.—Roller-ramming and molding machines and sand-handling appliance. Represented by George M. Etzel.

Moltrup Steel Products Company, Beaver Falls, Pa.—Line of steel pattern plates, including plates with pattern mounted, finished machine keys, cold-drawn steel bars and finished machine racks. Represented by F. H. Guppy and N. S. Leyda.

Monarch Engineering & Mfg. Company, Baltimore, Md.—Battery of core ovens of various types with oil, gas, coal or coke as fuel; stationary oil furnace, tilting oil furnace, tilting coke furnace; also single and double chamber furnaces for use without crucibles. Represented by H. D. Harvey, James J. Allen, W. Raber and F. Maujean.

Mott Sand Blast Mfg. Company, New York.—New type round table machine using direct pressure in blasting operation and arranged with vibrating separator for recovering abrasive material; direct-pressure sand blast barrels equipped with same recovery apparatus; cabinet for cleaning small tools; exhausters; dust collectors; standard direct-pressure hose machines and full line of accessories. Represented by E. J. Rosenthal, David Mayer, Foster J. Hull, Charles T. Bird, E. C. Gilmour, George D. Fletcher and Louis Schroeder.

Multi-Metal Separating Screen Company, New York—Respirators, sand blast helmets, dust hoods, babbitting masks and acid masks. Represented by Frederick Stern.

E. H. Mumford Company, Elizabeth, N. J.—Combination jolt and squeeze ramming split-pattern machines, low and high trunnion jolt squeezers, plain squeezers, plain split-pattern machines and jolt rammers. Represented by T. J. Mumford and H. W. Sinclair.

Mumford Molding Machine Company, Chicago, Ill.—High trunnion squeezer (10-in.). Represented by James T. Lee, Donald Alexander, Otto F. Weiss, D. M. Whyte, L. R. Palmer and Arthur F. Jensen.

National Engineering Company, Chicago, Ill.—Intensive pan mill 6-ft. diameter foundry mixer in operation. Represented by P. L. Simpson.

New Haven Sand-Blast Company, New Haven, Conn.—Sand blast rolling barrel, several hose type machines and other accessories. Represented by C. E. Billings, C. S. Johnson and Charles A. Dreisbach.

Norma Company of America, New York.—Line of precision ball, roller, thrust and combination bearings, arranged to illustrate the mounting of bearings and assembly of parts. Represented by E. A. Perkins and O. P. Wilson.

Norton Company, Worcester, Mass.—Grinding wheels for foundries of bench and floor types, showing new style protection and dust hoods; one machine is operation. Represented by Carl F. Dietz, A. R. Sandine and R. O. Anderson.

S. Obermayer Company, Chicago, Ill.—New type molding machine. Represented by S. T. Johnston, E. D. Frohman, J. E. Evans, O. C. Olson, F. H. Dodge, William Fenton, O. J. Peterson, C. M. Barker and William Fitzpatrick.

Oliver Machinery Company, Grand Rapids, Mich.—Universal wood milling machine, new ball-bearing jointer with safety features; universal saw bench with guards; vertical spindle and disk sander with ball bearings and single-pulley motor drive; 16-in. motor-driven heavy-duty engine lathe; 14-in. heavy-duty turret lathe and 1½-in. screw machine. Represented by A. S. Karkjian, R. F. Baldwin, M. D. Baldwin, Arthur Blake, J. R. Duthie, T. J. Piers and Herbert Walsh.

Osborn Mfg. Company, Cleveland, Ohio.—Roll-over jolts, stripping-plate jolts, split-pattern machines, air squeezers, stripping-plate machines, plain jolts and standard type molding machines. Represented by H. R. Atwater, E. T. Doddridge, M. W. Zeman, J. C. Alberts, E. W. Jacobi, A. J. Goss and others.

Oxweld Acetylene Company, Chicago, Ill.—Demonstration of oxy-acetylene welding and cutting equipment. Represented by E. E. Radcliffe.

Pangborn Corporation, Hagerstown, Md.

J. W. Paxon Company, Philadelphia, Pa.—Paxon-Colliau cupola showing the Zippler tuyereage system, also samples of molding and core sands. Represented by H. M. Bougher, F. J. Zippler and I. F. Kremer.

Phoenix Mfg. Company, Eau Claire, Wis.

Philadelphia Bourse, Philadelphia, Pa.—Represented by L. R. Duffield, who will be prepared to give information concerning the machinery exhibition and salesroom of the Philadelphia Bourse.

Pickands, Brown & Co., Chicago, Ill.—Solvay coke in foundry and crushed sizes. Bow and forward portions of Commodore Perry's flagship Lawrence, built almost entirely of coke. Represented by George A. T. Long, B. T. Bacon, E. A. Bateman, A. B. Hawes, J. A. Galligan, T. W. Glasscot and F. T. Lowering.

Pittsburgh Crushed Steel Company, Pittsburgh, Pa.—Samples of angular grit for sand blast machines and of concrete hardener and facing. Represented by G. H. Kann.

Portage Silica Company, Youngstown, Ohio.—Photographs of the company's plant and quarry, specimens of natural rock, samples of steel molding and core sands and sand blast sands. Represented by E. E. Klooz, C. M. Bixler and L. R. Farrell.

Prest-O-Lite Company, Indianapolis, Ind.—Demonstration of uses of oxy-acetylene welding and cutting apparatus in foundry work. Specimens of risers cut from steel castings. S. M. Paxton, Cleveland branch manager, in charge. H. E. Komitc, director of sales, and H. S. Smith, engineer, in attendance.

Henry E. Pridmore, Inc., Chicago, Ill.—Line of molding machines, power squeezers, power rock-over drop and combination jarring machines with new features. Represented by Mrs. Henry E. Pridmore, Harry A. Pridmore, Charles H. Ellis, D. F. Eagan and A. V. Magnuson.

Pyrotectite Company, Chicago, Ill.

Robeson Process Company, New York.—Speciments of cores, photographs and samples of glutrin. Represented by George N. Moore, T. J. Ryan and R. S. Hughes.

Rogers, Brown & Company, Cincinnati, Ohio.—Complete exhibit of pig-iron samples, showing influence of various chemical elements in pig iron; also collection of unusual castings. Represented by Standish Meacham, L. C. Calkins, F. J. Waldo, A. F. Stengel, W. T. Shepard, J. C. Mears, J. R. Morehead, T. A. Wilson, S. W. Hubbard, Harwood Wilson, A. J. Wentworth, W. H. Knight, F. W. Miller, F. W. Bauer, R. W. Clark, Cecil E. Bertie and H. W. Fernald.

Searchlight Company, Chicago, Ill.—Demonstrations of oxy-acetylene welding and cutting equipment, and compressed acetylene gas. Represented by R. A. Sossong, H. L. Jillson and P. A. North.

Sipp Machine Company, Paterson, N. J.—Motor-driven single-spindle sensitive drill press; one four-spindle drill press, and universal table drilling machine. Represented by C. A. Widmer.

W. W. Sly Mfg. Company, Cleveland, Ohio.—Cleaning mill, resin mill, sand blast mills with dust arrester, core oven, rotary table and photographs. Represented by W. C. Sly, George J. Fanner, R. J. Emerich and P. W. Graue.

Smith Facing & Supply Company, Cleveland, Ohio.—Display of the company's products. Represented by J. S. Smith, George W. Fleig and Ray Fleig.

Werner G. Smith Company, Cleveland, Ohio.—Core oils, cores and castings. Represented by John C. DeVenne, Milton S. Finley, Louis F. Ferster and Werner G. Smith.

R. P. Smith & Sons Company, Chicago, Ill.—Safety congress shoes for molders and foundrymen. Represented by B. B Smith, Jr.

Standard Sand & Machine Company, Cleveland, Ohio.

Sterling Wheelbarrow Company, West Allis, Wis.—Rolled steel flasks and wheelbarrows showing new features. Represented by I. R. Smith, H. H. Baker, J. J. Coyne, G. H. Lambkin, E. W. Dowd, C. L. Kirk, J. W. Dopp and J. M. Dickson.

Frederic B. Stevens, Detroit, Mich.—Foundry facings, core compounds, buffing compositions and new stamped steel ladle bowls. Represented by Frederic B. Stevens, W. J. Cluff, J. M. Mayers, Henry Krigner, James F. Hughes, J. M. Johnston, D. D. Baxter and Thomas E. La Mondy.

W. F. Stodder, Syracuse, N. Y.—Suction sand blast nozzle. Represented by W. F. Stodder.

Strong-Kennard & Nutt Company, Cleveland, Ohio.—Demonstration for showing strength of goggle lenses and method of determining color values in welding lenses. Protection goggles for grinding, chipping, polishing, welding; also respirators and masks for electric welding. Represented by Buell W. Nutt and Richard Cook.

Sullivan Machinery Company, Chicago, Ill.—Belt-driven angle compound compressor which will supply air to various pneumatic

tools shown by exhibitors. Represented by W. R. Jarvis and M. S. Sloman.

Superior Sand Company, Cleveland, Ohio.—Samples of molding sand. Represented by W. H. Smith, H. C. Koontz and W. J. Sallee.

Thomas Elevator Company, Chicago, Ill.—Several styles and sizes of wrenchless chucks in operation. Represented by D. T. Siegel and John L. Parkes.

Titanium Alloy Mfg. Company, Niagara Falls, N. Y.—Line of bronze and brass castings, titanium aluminum bronze castings, die castings and samples of ferro-carbon-titanium. Represented by H. H. Cook, A. C. Hawley, W. J. Evans, W. M. Corse, H. R. Corse and Charles Vickers.

Union Steam Pump Company, Battle Creek, Mich.—Inclosed steam-driven high-speed splash-lubricated air compressor, short belt-driven air compressor, vertical duplex short belt-driven and other air compressors.

United States Graphite Company, Saginaw, Mich.—Reception booth. Represented by H. F. Gump, F. B. Godard, W. W. Lampkin, R. A. Corrigan and F. J. Hannon.

United States Molding Machine Company, Cleveland, Ohio.—Plain jolt machines, plain air squeezers, combination jolt and squeeze, combination jolt squeeze pattern-draw, combination jolt pattern-draw, combination jolt roll-over pattern-draw, combination squeeze roll-over pattern-draw. Represented by J. N. Battenfeld, C. F. Battenfeld and Joseph Jirka.

United States Silica Company, Chicago, Ill.—Flint shot sand blast sand samples. Represented by A. Volney Foster and Harry S. Goebig.

Wadsworth Core Machine & Equipment Company, Akron, Ohio.—Stock core-making machines, sand mixing and compounding mill motor-driven; all-steel reinforced core trays, snap flask bottom boards and a working demonstration of jar ram box-lifting roll-over core-making machine. Represented by George H. Wadsworth, M. C. Sammons and Even George.

J. A. Wallace, Chicago, Ill.—Bench planer with flap and shutter safety guard, motor-driven. Represented by J. D. Wallace.

Warner & Swasey Company, Cleveland, Ohio.—Universal hollow hexagon turret lathe, motor-driven, operating on bar work, and universal turret screw machines, motor-driven, operating on chucking work. Represented by A. C. Cook, Ralph Glaser and W. E. Marshall.

West Haven Mfg. Company, New Haven, Conn.—High-speed power hack saw machine, hack saw blades and frames. Represented by A. A. Twichell and W. A. Gilbert.

Wheeler & Holcomb, Chicago, Ill.—Fireproof gloves, mittens, leggins, aprons, pants and coats of asbestos cloth, fire-proofed duck and leather.

White & Bro., Inc., Philadelphia, Pa.—Casting copper ingots, composition brass ingots and other castings from its ingots. Represented by Raymond Hunter, George C. Procter, Harold C. Reinhardt and Frank Krug.

Whiting Foundry Equipment Company, Harvey, Ill.—Photographs covering its entire line, such as latest type foundry cranes. Represented by C. A. Hardy, R. H. Bourne and G. E. Jones.

T. B. Wood's Sons Company, Chambersburg, Pa.—Taper snap molding equipment, including tapered snap flasks and automatic adjustable snap jackets; and also specimens of castings. Represented by Charles O. Wood, George M. Naylor and Victor Lesher.

T. J. Woodison Company, Detroit, Mich.—Electric vibrator of new design.

THE SMALL LEAKS OF THE BRASS FOUNDRY*

A Few Remarks Concerning the Standardizing of Supply Selection.

By Chas. T. Bragg.†

The reader will, no doubt, call to mind on reading the title of this commentary, how often he has, in moments of retrospection, resolved to standardize once and for all the small supplies used in his foundry.

It will be agreed at the start that the larger means of saving or the all important "rapid production," are being more obvious and their accomplishment more dramatic, therefore, more attractive. It will also be agreed that it is easier to make a large saving than a small one. The investigator always finds that everyone connected with a given institution easily understands his object and cheerfully aids in its accomplishment if it is large enough. There are three ways to explain this: First: Everyone likes to participate in an enterprise, the result of which will attract attention. Second: Everyone likes to feel the personal satisfaction attending accomplishment. Third: No one is at heart willing to be wasteful and any proposal to eliminate waste, which he can clearly understand, enlists his sympathy.

The writer holds that the experimental work of the brass foundry is never done. Also, that, a satisfied frame of mind, promoted by prosperity, or a neglectful frame of mind promoted by anxiety to "produce" above all things, are equally pernicious and sooner or later will react to disadvantage. Therefore, the spirit which prompts one to make a statement such as the one made in the first paragraph of this paper is decidedly wrong.

It would, however, be advantageous to standardize the means of selecting supplies and making small savings for three reasons.

First: The moral effect of constant vigilance will soon develop in the casual employee a habit of thrift and watchfulness.

Second: This method does not shut out the new things offered for consideration from time to time—but it does remove from the mind the uncertainty usually attending the adoption of a process or material which is "different."

Third: It installs that feeling of self-satisfaction that always comes to one who has his finger tips on the key to the situation, and permits one to listen to others with understanding.

*A paper presented at the Annual Meeting of the American Institute of Metals, September 11-15, 1916, at Cleveland, Ohio.

†Chemical Engineer, Ohio Brass Company, Mansfield, Ohio.

AMERICAN DEMAND FOR JAPANESE ZINC DUST.

There is a growing demand in the United States for Japanese zinc dust. It has been developing for seven years, but has increased considerably since the outbreak of the war, probably because other sources of supply have been cut off.

Almost 600 tons of zinc dust from this district are sent yearly to the United States. The greater part of this quantity is purchased by New York and San Francisco importers. The price at San Francisco is about 18 cents a pound.

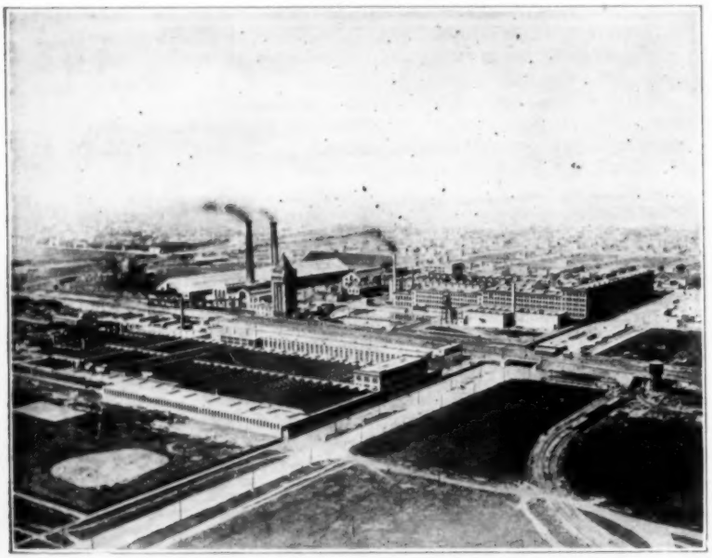
There is already a large zinc-smelting plant in connection with the Miike mines in this district. It is estimated that the yearly production of spelter is about 10,000 tons. An extension is planned, which will very likely be finished at the end of this year. The annual output will then approximate 15,000 tons. Although there is a demand for zinc oxide and zinc sulphide, there is no production of these at the Miike mines at present. The company has been advised by this office that inquiries with regard to these products have been received from the United States and it is possible that their manufacture will be undertaken later.

HOW A LARGE MANUFACTURING COMPANY DISPOSES OF ITS OLD METAL*

A Description of the Methods and Machinery Used For the Recovery of Metal From Refuse.

By J. M. Bateman.

One unaccustomed to the handling of raw material in large quantities little realizes the amount of work entailed in trying to dispose economically of the immense amount of waste incident to the carrying on of manufacture in a factory so large as the Hawthorne Works of the Western Electric Company.



HAWTHORNE WORKS OF WESTERN ELECTRIC COMPANY, HAWTHORNE, ILL.

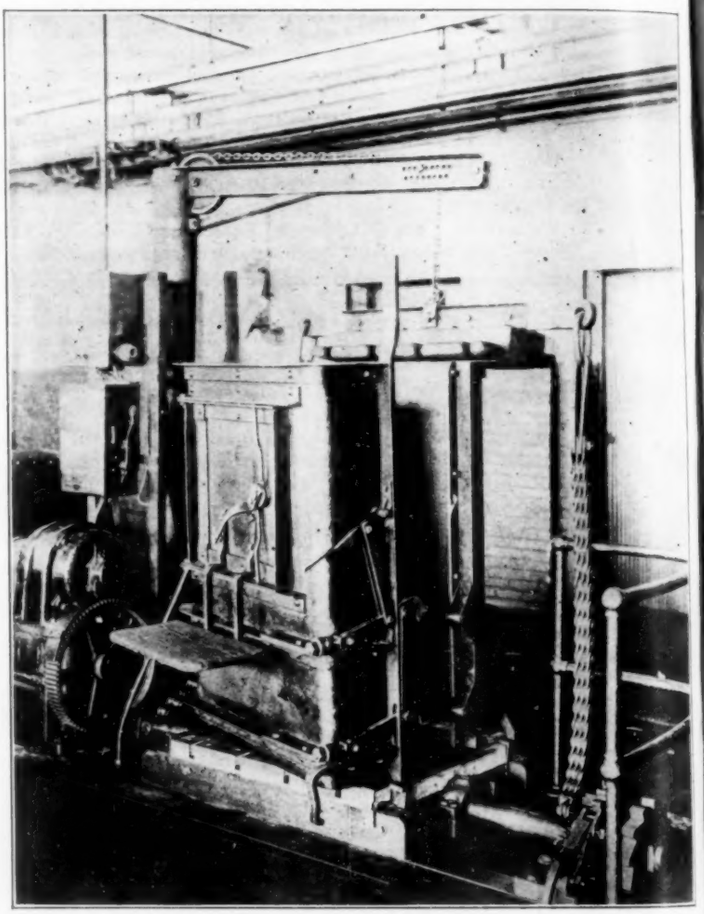
When, however, we consider a monthly raw material input approximating $1,500,000 in value, it is not difficult to conceive the amount of waste resulting from its use.

The following figures, which represent approximate monthly averages of the large items of junk disposed of to outside concerns, will possibly give the reader a somewhat clearer idea of the amount of material involved.

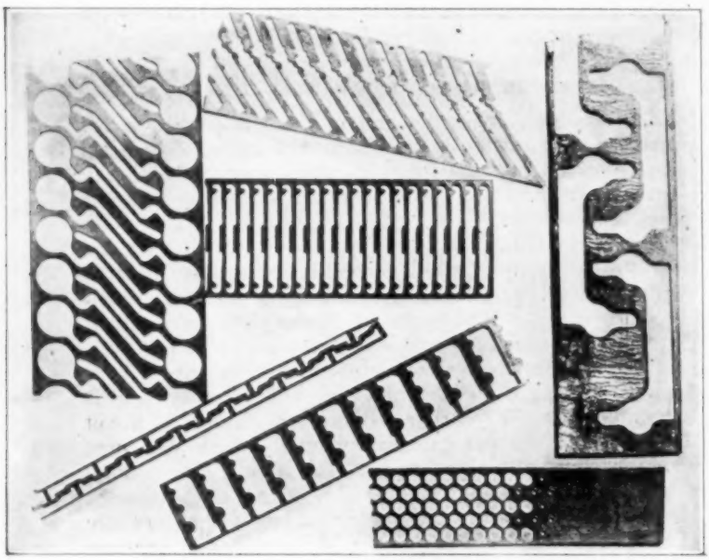
Brass, 100 tons; copper, 180 tons (125 tons from the Cable, Rubber and Insulating Shops); nickel silver, 17½ tons; iron and steel, 89 tons; solder skimmings, 4 tons; lead, 833 tons.

A vast number of the parts used in the manufacture of telephone apparatus are punched from sheet metal, brass, iron or nickel siler, as the case may be.

This operation, of course, leaves as waste a certain portion of the original sheet or strip. Representative samples of waste of this nature are here shown. All waste of this class is kept separate by material (brass, copper, nickel silver, etc.) in the operating departments, and sent by them to the by-products department or "junk room," as it is more familiarly called. Here it is baled in the Minich baling press. This electrically operated press compresses the waste material into a bale approximately two feet wide, two and one-half feet thick, and three feet long, which, when completed, weighs approximately 1,100 pounds, depending, of course, to a large extent upon the shape and size of the material used.



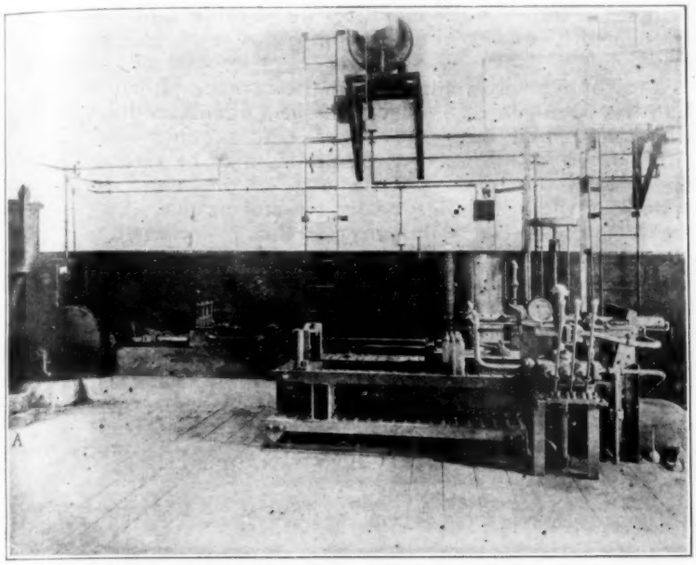
MINICH BALING PRESS.



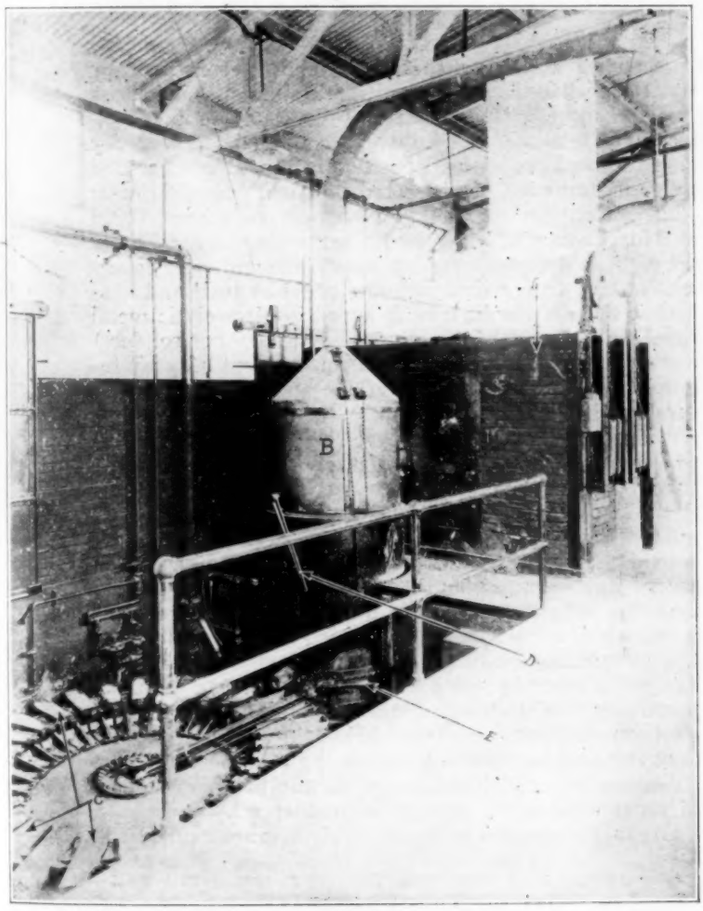
SAMPLES OF WASTE METAL.

*A paper presented at the Annual Meeting of the American Institute of Metals, September 11-15, 1916, at Cleveland, Ohio.

In addition to the machine above described, a Logemann hydraulic bundling press, similar to the press described later has recently been installed. This new press has a decided advantage over the press above described, for not only is it easier and more rapid of operation, but junk baled in a press of this type commands a considerably higher price, as the bales are much more readily handled, weighing only about one-tenth as much as those first described.



LOGEMAN HYDRAULIC BUNDLING PRESS.



MELTING FURNACE.

While the baling machine handles the larger pieces of scrap material, the smaller stuff—chips, turnings, sweepings from the machine department, etc.—are taken care of in a different manner.

The apparatus used for separating the dust and dirt from the small chips and metal shavings that are received from the machine departments, as well as the machine used in separating the iron from the brass is here shown. The mechanical separator (shown at A) is very simple in construction, consisting simply of a sifter which is oscillated by a small motor. Thus, the dust and dirt are separated from the usable chips and shavings.

SEPARATING IRON AND BRASS.

In the foreground here is shown the magnetic separator used in separating the iron from the brass in the sweepings and accumulations of small parts. The revolving drum C, which has an annealed iron face, is belt driven by a small motor D. Within the drum is fastened a series of powerful electro-magets, which extend in the form of an arc approximately from the bottom of hopper E to a point directly below the shaft on which the drum revolves. The chips and shavings are shovelled into the hopper and travel down the chute, which is at all points parallel to the periphery of the revolving drum. The brass shavings travel down this

chute into box F, while the iron chips, etc., which may have been mixed with them, are attracted by the magnets to the soft iron face of the drum, where they are held until they reach a point directly above the iron pan G, when they are released by the magnets. Both kinds of chips are then put up in sacks for convenience in handling.

In reclaiming the junked cable it is first placed in the gas-heated, brick-encased ovens A, where it is heated until the lead sheath has been melted and the paper insulation has been burned from the wire. The molten lead is run off into the refining furnace B, where it is automatically separated from the paper ash and other impurities which it contained when taken from the melting furnace. (Under former conditions the molten lead was made into pigs direct from the melting furnace, which necessitated an additional handling, as it had to be refined before being fit for sale.)

The refining operation completed, the molten lead is drawn off into the molds (shown at C). It will be noted that the molds are mounted on a turntable, so that one man can manipulate both the levers D and E, the former of which opens the gate and allows the metal to flow into the mold, while the latter turns the table upon which the molds are mounted. As the filled molds pass around toward the left they travel under running water, which so cools the lead that the molds, which are pivoted, can be tipped and the pigs of lead extracted. While a portion of this lead mixture can be used in the press room, much of it contains too great a percentage of impurities to meet the severe requirements demanded in the manufacture of cable, and it is consequently sold to refining companies to be further purified.

The copper wire remaining in the furnace after the lead has been run off is placed in the Logemann press and compressed into brick form before being sold. Some of the compressed wire bundles may be seen at the extreme left of the picture.

Besides the reclaiming of junk metal as described, the Western Electric Company reclaims every particle of waste matter in its manufacturing operations. These operations have not been touched upon in view of the fact that those operations would be irrelevant to matters as taken up in this convention. It is a fact, however, that the Western Electric Company is not far behind the pork packers, who, you will remember, boast that they use all of the pig but the squeal.

ADDITION AGENTS IN THE ELECTRO-DEPOSITION OF SILVER FROM SILVER NITRATE SOLUTIONS*

AN ARTICLE OF INTEREST TO ALL ELECTRO-PLATERS OF SILVER

BY FRANK C. MATHERS AND JOHN R. KUEBLER†

(Concluded from August.)

THE EFFECT OF ORGANIC SUBSTANCES

The darker, smoother and more shiny the cathodes, the greater was the quantity of occluded material. Some analytical results are as follows:

DESCRIPTION OF CATHODE.	Percent loss on drying at 160° C.	Percent loss from 160° C. to ignition with a Meker burner.
White, slightly crystalline.....	0.13	0.77
White, smooth	0.28	0.99
White. No swelling when heated....	0.15	0.23
Shiny and smooth	0.64	1.22
Shiny and smooth.....	...	1.16

The loss at 160°C. seemed to be influenced by the length of time the samples had been air dried. All of the above samples were from baths containing tartaric acid but no glue.

The density of the air dried samples which were mechanically removed from the starting sheets varied from 9.84 for dark shiny samples to 10.07 for crystalline ones. After ignition until sample had expanded to maximum volume and the color had become silver white, the apparent specific gravity of a shiny sample was as low as 8.8. The specific gravity was raised to 9.37 by putting the pycnometer under reduced pressure which caused a vigorous evolution of bubbles from the pieces of silver. This shows that the escape of the occluded substances during the heating puffed the silver into minute gas chambers. The specific gravities of different cathodes did not agree, due to the influence of the conditions of electrolysis which affected the quantity of occluded material and also to the effect of the temperature and time of heating and the size of the pieces of silver.

Current efficiency at the cathode.—A bath containing 3 per cent. of silver as nitrate, 3 per cent. of nitric acid and 3 per cent. of tartaric acid gave a cathode efficiency of 101.8 as compared with a silver nitrate coulometer and 101.82 as compared with a copper coulometer. This shows 1.78 per cent. of impurities in each 100 grams of deposited silver, a number approximately equal to the loss on ignition for shiny silver given above.

REVIEW AND DISCUSSION

About 10 per cent. of the silver output is electrolytically refined in solutions of silver nitrate containing nitric acid. For the most part, the silver is deposited in the well-known crystalline, non-adherent condition. There are many advantages in the deposition of the silver in a solid coherent form[2]. Chemists at the United States Mint at Philadelphia devised the improvement of adding 0.008 to 0.01 per cent of glue[3] to the baths each day, whereby the cathode deposits were less crystalline and were coherent enough that vertical cathodes could be used and handled in the way ordinarily followed in electrolytic metal refineries. A c. d. of 8 amp. per sq. ft. (0.9 per sq. dec.) was used. The cathodes, as shown by a cut of a photograph[3], were rough and crystalline and in no way comparable in smoothness with the cathodes obtained in this research by the use of tartaric acid. The use of glue which was adopted by other of the United States Mints[4] has now been discontinued because it was of little value at the higher c. d. of 15 amp. per sq. ft. (1.6 amp. per sq. dec.), which was necessary for the sake of speed. It is said that the crystalline silver cathodes, without the use of any organic material, are coherent enough that they can be withdrawn from the baths if sufficient care is exercised.

This same action of glue in restaining the crystallization of the silver has been noted in silver nitrate solutions containing traces of nitric acid[5], in pure silver nitrate solutions containing no free nitric acid or other impurities[6], and in these same solutions using rotating cathodes[7].

Tannin, pyrogallol and resorcinol are of no value and an excess makes the deposits non-adherent[5].

Organic impurities of many kinds in pure neutral sil-

*A paper presented at the Twenty-ninth General Meeting of the American Electrochemical Society, held at Washington, D. C., April 27-29, 1916.

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[2] Betts, Trans. Amer. Electrochem. Soc., 8, 121 (1905); Easterbrooks, *ibid.*, 132.

[3] Annual Rep. of Director of U. S. Mints, 1905; Met. Chem. Eng. 4, 307.

ver nitrate solutions were found[6] to affect the character of the silver deposit which was "non-crystalline or imperfectly crystalline, depending upon the quantity of the impurity present." The things tried were: aqueous extract from various kinds of paper—filter, writing, blotting, rag and wood, pine wood shavings, silk, cotton and linen. The same effect was produced by glue, by Bredig's colloidal silver and by one per cent. additions of the following: hydrazine, hydroxlyamine, dextrose, invert sugar, formaldehyde, acetaldehyde, furfuraldehyde, benzaldehyde, phenol, resorcinol, hydroquinon, and phloroglucin. All of these substances which affect the silver deposit have the power of reducing solutions of silver nitrate to colloidal silver. Silver nitrite silver hyponitrite, starch and cane sugar were without action on the silver deposit and they do not form any colloidal silver in the baths. The theory is advanced that the colloidal silver is the essential thing and that each particle of this colloidal silver which is deposited upon the cathode becomes a nucleus for a new silver crystal, hence the deposit becomes a mass of very small crystals rather than a much smaller number of large ones. Moreover, all deposits, where the addition agent has shown an action, are heavier than required by Faraday's Law. A weakness in this theory is that it cannot apply to solutions containing free nitric acid which would prevent the reduction to colloidal silver but the presence of nitric acid does not prevent the action of the glue and other substances in restraining the crystallization of the silver deposit.

In the separation of silver from antimony, the silver has been deposited from solutions containing silver nitrate, nitric acid and tartaric acid in a non-weighable form[8] and in a "faultlessly crystalline condition of silver luster."[9] The action of the tartaric acid in restraining the crystallization of the silver was apparently overlooked, probably because the experiments were run, for the most part, in warm solutions, a condition which partly prevents the action of the tartaric acid.

Nitric acid or calcium nitrate in pure silver nitrate solutions increased the number of crystals in the silver deposit. Silver acetate increased the number of crystals 100 times, the deposit being like a "surface of frozen snow."[6] Ammonium acetate was found to improve the deposits for quantitative work.[10] These results show that the acetate radical is partly effective as an addition agent if we accept the idea that the function of an addition agent is to make the crystals very small and coherent but not so small nor so impure from absorbed addition agent that the deposit becomes spongy and non-adherent.

All of the organic acids tried in this work had an influence on the deposits which in most cases were made more finely crystalline and coherent. Only tartaric and citric acid gave smooth deposits showing little or no crystalline structure. These organic acids, tartaric, and to a lesser extent citric, acted very differently from the ordinary colloids. One important difference is the beneficial effect of large amounts of the tartaric acid while any excess of makes the deposit non-adherent. Tartaric and citric acid are not generally classed as reducing agents although the glue and other colloids or of some of the organic acids former does reduce silver from alkaline or even from neutral solutions. Any reducing action they might have would be negligible in the presence of the free nitric acid. It seems that the effect of these acids cannot be due to their reducing properties.

Silver phosphate in phosphoric acid solution gave a spongy deposit.[11] Pyrophosphoric and nitric acid in silver solutions showed no advantage over cyanide for quantitative work.[12] No mention was found of the deposition of silver from solutions containing metaphosphoric acid.

No physical experiments were tried to determine the reasons for the beneficial action of the acids. Complexes between the silver, the tartaric acid and the iron, when present, might be the essential thing.

Addition agents in silver nitrate solutions only have been considered in this review and in this research.

SUMMARY.

Tartaric acid is the most effective substance for producing solid, firm deposits of silver from the ordinary silver refining bath containing silver nitrate and nitric acid. A good composition of the bath is 3 per cent. each of silver as silver nitrate nitric acid and tartaric acid. The further addition of 0.01 per cent. of glue twice daily makes the deposit much smoother and of a darker, more shiny color.

The addition of 2 per cent. ferric nitrate to the above bath makes the deposits much smoother, darker and more shiny. Analysis of a cathode showed 0.086 per cent of iron.

If economy in addition agents is desirable at the sacrifice of some smoothness in the deposit, 0.5 per cent. tartaric acid and 0.01 per cent. of glue twice daily can be used. More tartaric acid must be added after about 100 grams of silver have been deposited from each 100 cc. of solution, otherwise loosely adhering crystals are formed.

A current density of 22.4 amp. per sq. ft. (2.45 amp per sq. dec.) in a vigorously stirred bath gave a firm, smooth deposit which was a little heavy on the edges. A current of 35 amp. per sq. ft. (3.8 per sq. dec.) gave a firm deposit with still rougher edges. In a bath only gently mixed or stirred, 7.4 amp. per sq. ft. (0.8 amp. per sq. dec.) gave the best results. With 6 per cent. silver solutions, 14.8 amp. per sq. ft. (1.6 per sq. dec.) could be employed.

The ordinary addition agents as glue and peptone, by themselves, only partly restrained the crystalline structure and did not produce smooth deposits.

Metaphosphoric acid caused the deposit to be hard and non-crystalline but the bath soon deteriorated.

The weight of tartaric acid used up is 0.005 of the weight of silver refined. The maximum cost of the tartaric acid and the glue at present prices is 0.23 cent per pound of refined silver.

The deposit is brittle, hence it is of no value in plating.

The authors wish to thank the American Electrochemical Society and its Committee on Assisted Research for the loan of the silver bullion which was used in this research.

[6] Eng. Min. Journ., 92, 901.
[7] Jarvis and Kern, School Mines Quart., 30, 100.
[8] Rosa, Vinel and McDaniel, Bull. Bur. Standards, 9, 209.
[9] Snowden, Trans. Amer. Electrochem. Soc., 7, 143.
[8] Smith, Z. anorg. Chem., 4, 237; through Trans. Am. Electrochem. Soc., 26, 62.
[9] Fischer, Ber., 36, 3346 (1903).
[10] Hughes and Withrow, Jour. Am. Chem. Soc., 32, 1573.
[11] Smith, Am. Chem. Jour., 12, 335.
[12] Brand, Z. anal. Chem., 25, 592.

NORWAY'S COPPER SUPPLY.

Information has just reached the United States Department of State to the effect that an agreement has been entered into between the governments of Great Britain and Norway whereby the latter places an embargo on the exportation of raw copper and receives uninterruptedly copper importations from the United States but releases an amount equivalent to such importations for shipment to England. The amount at once available is said to be 3,000 tons.

NOTES ON THE INSPECTION OF BRONZE AND BRASS*

Some Conclusions Resulting from Investigations Made Upon Metals Used in the Catskill Aqueduct Water Supply.

By Ernest Jonson, Engineer Inspector, New York Board of Water Supply.

CASTING AND MOLDING DIFFICULTIES.

Brass and bronze castings are subject to various defects which are difficult to discover by surface inspection, or even by hydrostatic testing, when such a test is practicable. The defect which most commonly occurs results from the inclusion of oxide in the metal of the casting. This occurs in two ways: either the molten metal contains an admixture of oxides, owing to insufficient protection of the molten metal from the air, or the dross from the surface of the crucible or furnace charge gets into the mold and is caught at some point where the flow is slight, and is thus prevented from coming to the surface in the risers.

In the former case the entire casting is bad, and the best way to discover this defect is to make tensile tests on specimens cut from a coupon cast from the same melt. The admixture of oxide is indicated most distinctly by the greatly reduced elongation, but also by low ultimate strength. The tensile test should, therefore, be specified for all important brass and bronze castings, no matter whether a certain strength and elongation are of mechanical value or not. The metal in every important brass or bronze casting should have the strength and elongation typical of the mixture of which it is made as an evidence that the metal in the casting is clean. If a tensile test is impracticable, oxidation in the metal may be discovered by making a bending test on a machined specimen. The presence of oxide will then be indicated by a number of small cracks which open on the outside of the bend, and if the oxidation is extreme, also by the abnormal color of the surface of the fracture.

The writer's experience indicates that oxidation of metal in the crucible is a very common defect, especially of the mixtures of high percentage of copper, that is, of the bronzes. It is the writer's belief that in foundries where tensile or hydrostatic tests are not made, the metal is generally allowed to become considerably, and in many cases seriously, oxidized in the crucible, because this defect in the metal does not show on the surface of the casting. To specify bronze castings merely by the mixture is therefore useless. Unless the metal is tested after it has been poured, one is not justified in assuming that it consists of a clean uniform mixture of the ingredients put into the crucible, or even that the proportions of the mixtures are the same as originally made, for the proportion of one or two of the ingredients may have been decreased by oxidation. A bronze casting may be made of the correct mixture and may show no surface indications of defects, and still it may be nothing but a honeycomb of metal, the cells of which are filled with oxides.

The presence of included dross is more difficult to discover. If a hydrostatic test cannot be made, it is practically impossible to find such defects unless they happen to come to the surface of the casting, and even a hydrostatic test does not always discover such defects, because there may be considerable thickness of good metal along one or both of the surfaces of the casting. The best insurance against this kind of defects is correct molding, a thing which, strange to say, is very unusual. This fault, however, cannot be charged entirely to the foundryman. The designer is often equally at fault. The molding of a casting should be planned while the casting is being designed, and before its final shape is determined. Every brass or bronze casting should be designed with reference to a given position in the mold. The position being determined, the various parts of the casting should be so arranged that they are connected by a rising channel of increasing cross-section and with a minimum of offsets with one of the risers, which, of course, should be of much greater diameter than the thickest part of the casting. The chief reason for this rule is evident. The thinner the metal the sooner it solidifies; hence if a portion of the casting is separated from the riser by another part of the casting which is of less thickness, the metal in the heavier part of the casting would be fed by the riser only to the point at which the thinner connecting portion of the casting solidifies. After that the shrinkage will result in the formation of cavities in the heavy part of the casting. Chills may to some extent be used as a substitute for this arrangement, but only when a channel of increasing dimensions is impracticable, and then only to a limited extent.

When a casting is thus correctly designed with reference to molding, it is evident that there is much less likelihood of dross being caught in the mold, but that instead it will flow up into the risers. The foregoing presupposes, of course, that the pouring gate enters the mold at its lowest point.

Whenever practicable, castings should be poured from the bottom. There are certain castings which cannot be poured from the bottom, but it is a question whether castings poured from the top are ever quite free from dross. Hence, very important castings should be so designed that they can be poured from the bottom. Doing this will sometimes involve considerable expense, as the castings may have to be made much thicker than they need be, and perhaps also much machine work may be required to bring them down the required thinness.

In determining the position of the casting in the mold extensive flat upper surfaces should be avoided, as dross may accumulate by being caught under the flat surfaces of the mold or core. When a flange forms the upper surface of the casting, it should be expected to contain some dross and an adequate amount of finish should be allowed so that this dross will be entirely removed in machining.

Another source of trouble is insufficient risers. A casting may be made in full accordance with the drawings and specifications, and yet contain deposits of dross which may cause it to fail under ordinary working conditions, and still these defects may be such that they would not be discovered by the most careful inspection, and even by a hydrostatic test. It is therefore unwise to leave the decision as to the number and size of risers to the foundryman who may be prejudiced by consideration of economy in favor of fewer and smaller risers than is consistent with the highest quality of casting. It would seem, therefore, that in specifying brass or bronze castings the total cross-section of the risers should be given in per cent. of the greatest horizontal cross-section of the casting.

Brass and bronze castings are expensive to make, and it is therefore undesirable to reject such castings on account of defects which can be remedied. Minor leaks in hydraulic casting may be stopped by peening, but the fact that the casting leaked at a certain point generally indicates that the metal was defective at this point. It is commonly believed that certain brass and bronze mixtures

*Read at the Cleveland, Ohio, meeting of American Institute of Metals, September 11-16, 1916.

are normally porous and permit water to pass through them under high pressure. This belief, however, is erroneous, at least up to a pressure of 1,000 pounds per square inch. If water comes through the walls of a casting even in very minute quantities under pressures which do not exceed 1,000 pounds, this is an indication that the metal is not clean, or that the casting is porous from some other accidental condition. Peening is therefore a questionable method of treating defective spots in brass or bronze castings. If the defect is small and other circumstances permit, a hole may be drilled and a plug of the same metal as the casting may be screwed in. If plugging is not practical or permissible, defective spots should be cut out by chipping or drilling so that all the defective metal is removed. It is difficult to determine just how much cutting should be done, because any cutting tool that may be used will cause the metal to flow sufficiently to cover up minor defects and make it appear solid. Etching with a mixture of ferric chloride and hydrochloric acid would probably reveal poor metal thus hidden by the rubbing of the tool. The cavity may then be filled by melting metal into it from a rod by means of a gas flame, or by pouring metal into it from a crucible. In either case this must of course be done in such a way that the entire surface of the cavity is melted and thus consolidated with the added metal. If a gas flame is used there is some danger of the filling not being solid, but if it is poured from a crucible with reasonable care, there can be no doubt about the soundness of the metal in the weld.

Brass or bronze when stressed above the initial elastic limit, and the full stress is maintained for a considerable length of time, will fail by cracking, as soon as oxidation takes place on the surface, which is bound to happen sooner or later. This property of the copper alloys was described by the writer in a paper read before the American Society for Testing Materials, in 1915. When a defective spot in a casting is welded, the cooling of the metal in the weld will be accompanied by contraction which will put a tensile stress in the metal of the weld as well as in the old metal which surrounds it. If the metal of the weld is the same as that of the casting its elastic limit may be appreciably higher than that of the rest of the casting, because the metal in the weld solidifies much more rapidly than that in the rest of the casting. The permanent deformation resulting from the shrinkage of the weld will, therefore, take place in the surrounding metal, and this metal will therefore remain in a state of tension greater than its initial elastic limit, and after a while cracks will appear. If the casting is of small lateral dimension, and the ends are not constrained, and the break extends all the way across it, the stress set up in the old metal by the shrinkage of the weld is compressive, and therefore there is no danger of cracking. In all other cases shrinkage stress must be prevented by keeping the casting heated to a very high temperature while the weld is being made and until it has solidified. The elastic limit of the surrounding metal will thus be temporarily lowered and the flow will take place under a stress much lower than the initial elastic limit of the cold metal, so that there will be no danger of cracking after the metal has cooled. Another way to prevent cracking is to anneal the casting immediately after the weld has been made. There is no reason to believe that the metal surrounding the weld is injured by the shrinkage stress until corrosion occurs on its surface. Therefore if the elastic limit of the metal surrounding the weld is lowered by heating the entire casting to a sufficient high temperature, additional flow will occur, and the cooling stress thus gradually reduced to a very small minimum according to the length of time the annealing is continued. The annealing temperature should be maintained for several hours so as to give the metal time to flow. Repairs of this kind should, of course, be made before any machining has been done, because the dimension of the casting may be appreciably affected by the shrinkage in the weld as well as by the annealing. Castings which are subject to hydrostatic test should therefore be given a preliminary test before any machining is done. A pressure of 100 pounds, or even less, will generally be sufficient to reveal defects.

MECHANICAL CAUSES OF STRESSING.

In machining brass and bronze castings trouble frequently arises from the fact that the pattern maker did not make proper allowance for minimum shrinkage. When a brass or bronze casting is constrained, shrinkage in the constrained direction is generally very much less than normal shrinkage. Core or other inside dimensions, which are tied up with outside machining dimensions, should therefore not be laid out on the pattern with a shrinkage rule, but with a normal rule. The designer can aid in preventing errors of this kind by marking over-all machining dimensions of castings "Must Be Exact," when it is really necessary that they should be exact. This practice would result in an economy of metal, in so far as extra thickness would not have to be added to flanges except when thus marked on the drawing. Where not marked to be exact, the common practice would naturally be followed, which is to lay out the faces of flanges from the back of the flange whenever a deficiency of thickness of flange would result by tieing up the dimension to the face of the flange with the main lines of the layout.

When a rod, bar, tube, or shape of brass is pulled through a die, the permanent reduction of its dimensions is proportionately greater at and near the surface than in the interior. This is proven by the fact the diameter of a draw bar may be increased by squeezing it, and thus causing the metal in the surface layer to stretch, so as to allow the elastically compressed interior to expand. The stress thus set up in the surface of drawn brass frequently exceeds the initial elastic limit, and cracking may therefore be expected after some time when corrosion takes place. This is the reason why this defect is called "season cracking." Drawn material should therefore not be allowed to retain its initial stress for any considerable length of time, but should be immediately treated in some way to relieve the stress. Initial stress may be relieved in two ways: either by stretching the metal near the surface by mechanical work, or by temporarily reducing its elastic limit by heating, and thus allowing it to be stretched by the compressive stress in the interior metal. The mechanical working used for this purpose is either squeezing between the rolls of a straightening machine or bending the bar successively in four directions called "springing."

Annealing is also used to some extent to eliminate initial stress by lowering the elastic limit. An important fact with regard to annealing drawn brass was brought out by Merica and Woodward in the paper which they read before this institute at its meeting in 1915. This fact is that if sufficient time is allowed for annealing, so that the metal is given ample opportunity to flow, the temperature need not be as high as it would have to be in order to eliminate initial stress by a quick annealing. It is therefore possible to eliminate initial stress by slow annealing at a low

temperature without appreciably lowering the elastic limit given the material by the drawing. The work done by Merica and Woodward in connection with the study of initial stress and season cracking will be published in full detail in a paper now being prepared by the Bureau of Standards.

CONCLUSIONS.

The presence of intial stress in wrought brass may be detected most quickly by cutting a longitudinal slit into the end of the piece. If the initial stress is of sufficient magnitude to be objectionable, the two halves of the piece will curve out to a measurable degree, that is, to a degree sufficient to be detected by means of an ordinary micrometer, and if the stress is great the curvature even may be visible.

Extruded brass rods are sometimes subject to a hidden defect, namely, piping. Such rods are generally cut to length by sawing, and if the pipe is small it will be hidden by the rubbing of the saw. The presence of this defect may be discovered by knicking the end of the rod and breaking it off.

Another important practical application of the principle that brass must not be kept under stress greater than its initial elastic limit and equal to its acquired elastic limit for any considerable length of time, is with regard to bolts. It is evidently very difficult, one might even say practically impossible, to fit and tighten a bolt in such a manner that one is sure not to stress it above the initial elastic limit, if not all through the section, at least on one side. All bolts used in flanged connections are stressed more on one side than on the other side, because of the deflection of the flanges, and even under the most favorable conditions when the conected parts are so stiff that the deflection is insignificant, brass bolts may easily be drawn up so tight that the entire cross section at the root of the thread is stressed above the initial elastic limit. Workmen get their experience with bolts mainly from handling steel bolts which may be drawn up much above the initial elastic limit without injury, and therefore they are apt to handle brass bolts in a way which will cause failure. Brass and bronze are therefore metals which should be regarded as generally unsuitable for bolts and studs, and which may be used for these purposes only under special favorable conditions, when there is no chance of eccentric stress or excessive tightening. A good rule to be followed in drawing up brass bolts is to draw up a little tighter than is necessary and then relieve the stress on it by turning the nut back a fraction of a turn. In this way the permanent stress in the bolt will be less than the elastic limit.

Another source of defects in brass work lies in the heat treatment by workmen unfamiliar with the properties of brass. Occasions for heat treatment arise when brass is bent hot, forged, or rivets are to be driven hot. Men accustomed to do such work on iron and steel are very liable to ruin the brass by overheating. This over-heating produces an interior oxidation, probably by opening fissures between the grains, and thus the strength of the material is greatly reduced and the ductility reduced almost to zero.

Defects of this kind are apt to be very troublesome because they are difficult to discover by surface inspection, and, of course, tests cannot be made on finished material. The best insurance against trouble of this kind is to allow no brass forging of any kind to be done by men who are not experienced in this kind of work. Specifications for such work should provide that no hot working of brass should be done by a concern not regularly engaged in such work, and when this precaution has been taken, hot working should be avoided as much as possible. Brass being very ductile may be formed into any shape by cold working accompanied by whatever annealing may be necessary. Large rivets must be driven hot, but flanging and other kinds of bending should be done cold; and even so it is important that this work be done by experienced men and in shops equipped with the necessary appliances; for instance, the flanging of circular beads should be done by pressing between dies, and in several stages, each being followed by annealing. One should not attempt to do such work on brass by hammering over a form, as is done with copper.

COPPER SULPHATE FROM SCRAP.

Q.—Will you please give us any information you can regarding the manufacture of blue vitriol from copper scrap. We understand this can be done to advantage.

A.—The most advantageous way to make copper sulphate or blue vitriol from copper scrap is to bring the copper in contact with dilute sulphuric acid together with heat and air. The proper procedure in order to get the most economical results would be to convert the copper scrap, if it is now in metallic form, into thin flakes of copper which would offer as much surface as possible to the action of the sulphuric acid, one method being to melt the copper and pour it into water and thereby forming hard irregular shaped globules. These globules then should be packed lightly in a tower which might be built up of earthenware cylinders and dilute sulphuric acid allowed to trickle down through the copper, while a current of air enters at the lower end.

After the acid begins to work on the copper, heat is generated and the air being more rapidly sucked up through the column of copper, oxidizes it and makes it more readily soluble in the sulphuric acid. The resulting liquor that emerges from the base of the tower is conveyed to shallow lead lined pans which are set upon top of steam pipes so that they may be heated and the solution is then evaporated until it has a gravity of 28 degrees Baume. At this gravity the solution is then run off into deeper lead lined tanks which have hung in them, supported by bars across the top of the tank, strips of sheet lead. The solution is allowed to cool and the copper sulphate will crystallize out on the sides and bottom of the tanks and also on the lead strips.

The crystals are then removed from the tank after the mother liquor has been drawn off, and this liquor can again be used to dissolve more copper in the tower. The crystals are washed in water and then finally assorted by screening and dried and packed for shipment.

A more simple method would be to digest the copper with dilute sulphuric acid in a container which could be heated and allow for the admission of air which would keep the solution agitated. Then after this solution had become saturated with copper it may be placed in lead lined tanks, boiled as before and the crystals of copper sulphate crystallized out in the same way as described above.

The difference between this process and the first one outlined would be that the product would have to be purified by re-crystallization which process, however, would not cost as much as the re-melting operation required in the first process.—K.

DUTCH SPELTER.

The production of spelter in the Netherlands amounted to 24,486,000 pounds in 1915, compared with 36,196,600 pounds in 1914.

ELECTRO-PLATING ENGINEERING

A Series of Articles Relating to the Operations and Equipment Employed in Electro-Plating and the Reasons Therefor.

Written for The Metal Industry By C. B. Willmore, Electro-chemist.

(Continued from June.)

PROTECTION AGAINST CORROSION.

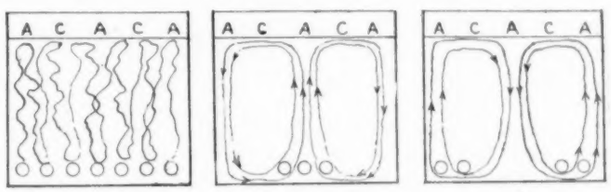
A steel tank will not rust at those places where it is covered with alkali, as the alkali itself is a protection against rusting. It may rust, however, on the ouside where there is no alkali, unless it has been covered with a protective coating. It will certainly rust on the bottom if it is allowed to rest directly on the floor, as in such a case it will be kept damp continually and enough oxygen will be present to permit the oxidation of the iron to go on uninterrupted. The bottom of the tank is the place where it is most apt to rust and the place where the greatest protection must be given to the steel. It should be given an extra coating of the protective material at this point and the tank should be blocked up off the floor at least three or four inches to keep it away from the damp floor and to allow free circulation of air to keep it dry. The black scale of magnetic oxide of iron (Fe_3O_4) which is formed on the surface of the steel plates when they are being hot-rolled is in itself a good protection, provided it is perfectly adherent. Some of this scale, however, will peel off in time and if a protective paint has been put on over it, the paint and all will come off, leaving an exposed portion of the metal underneath. Before the application of the protective paint, therefore, the outside of the tank should be gone over thoroughly with a stiff wire brush. This preliminary scratch-brushing not only removes any loose particles of scale, but presents a good clean surface to the coat of paint, which will cause it to adhere much more firmly. A satisfactory asphaltum paint may be made by melting together about three parts of ordinary tar with one part of asphaltum, allowing to cool and dissolving to a thin syrupy consistency with benzene. Or it may be purchased already prepared in the liquid form. It makes a relatively cheap and quite satisfactory coating for the metal. Better protection, if desired, can be obtained by applying a first coat of either zinc chromate, lead chromate, or red lead in oil (these materials are listed in the order of preference) and applying over this a second coating of either asphaltum, iron oxide, or zinc oxide paint. Of these combined coatings, the cheapest combination is that of red lead for the first coat, and asphaltum for the second coat. If any further information on the subject of protecton of steel is desired by the reader, I should refer him to Wood's book on "Rustless Coatings," or Cushman's "Corrosion of Iron and Steel."

As was mentioned previously, the iron tank carries a certain portion of the electrolyzing current, the magnitude of which is proportional to the electrical conductance of the indirect path from anode through the solution to the tank, along the metal of the tank, and back through the solution to the cathode. Where this anode, metal will be plated out of solution onto the iron. Where it leaves the iron tank to return to the cathode, we should expect that the iron at this point, inasmuch as it acts as anode, would be eaten away just as any ordinary anode would be. But iron is insoluble in alkaline solutions, so instead of direction corrosion of the tank by solution, we have simply an oxidation of the iron by the oxygen evolved during the electrolysis of the solution. This oxide film then partially protects the metal underneath it, and at the same time increases the resistance of the indirect path of the current, and thus cuts down the amount of stray current. Where the anode effect is spread over such a large surface, the rate of oxidation is very slow, so that there is practically no danger to the tank from this source and no internal coating is needed on the iron.

In electric cleaners, where the tank is used as anode, and the current density is extremely high, the rate of formation of this oxide of iron and consequent increase in resistance is such that after a time a sufficient amount of current cannot be sent through. This necessitates the cleaning of the tank by drawing out the caustic and scraping the inside. Such rapid formation of scale, with accompanying necessity for scraping it off will ultimately wear out the tank. A better plan to follow is that suggested by Mr. H. J. Ter Doest, in The Metal Industry for May, 1914, who uses an iron plate for anode, which he can easily and conveniently take out and clean at any time, and thus save the tank.

HEATING THE SOLUTION.

The use of hot solutions for plating is constantly gaining in favor. To heat a tank full of solution, there is only one feasible agent, and that is steam. There are two methods of heating a plating solution with steam. The first or indirect method is to simply run the steam through coils placed in the bottom of the tank. The manner of placing the pipes in the bottom of



THEORETICAL CONSIDERATION AFFECTING THE CHARACTER OF CIRCULATION CAUSED BY STEAM PIPES.

the tank is important, as the position of these pipes largely determines the character of the circulation set up in the solution by the heating. It must be remembered that this effect of circulation is one of the greatest benefits which result from using a hot solution, as it causes solution which is rich in metal to be constantly brought to the cathode surface and thus permits higher current densities to be used. The pipes should therefore be placed with the idea in mind of obtaining the best possible circulation of the solution. Figure 10 illustrates three different methods of distributing the pipes. In A the pipes are uniformly distributed over the bottom of the tank, and as a result the circulation is very non-uniform, being broken up into a number of erratic currents of varying direction. An ascending current of warm solution will very likely meet with a descending current of cooler solution, and the result is that they intermingle and nullify each other's effects. If, on the other hand, a few pipes are placed in the center of the tank bottom, as in figure 10-B, a strong current will be set up at the center of the solution, which will not be interfered with at all by the two descending cooler currents at the sides of the tank. If the pipes are arranged

as in figure 10-C, the circulation is just as strong, but its direction is reversed. This method has the advantage over method B, that whereas in B there is a current of metal-rich solution flowing from only one anode to two cathodes, in method C, on the other hand, there are two metal-rich streams of solution flowing from two anodes to the two cathodes. The latter method is a decided advantage, as more metal is brought to the cathodes, and higher current densities can therefore be used.

If live steam at fairly high pressure is available, the direct method of heating may be used. In this method, the steam itself enters the solution through the pipes in the bottom of the tank, gives its heat up to the solution and is itself condensed to water. This method of heating is somewhat more economical of steam, as all of the heat in the steam is given to the solution. Also, the condensation of the steam just about makes up for evaporation of the solution and keeps the solution at about the proper dilution. If the only steam available is low pressure exhaust steam, then the amount of condensation by the direct heating method would exceed the rate of evaporation and the solution would become too dilute, so that the direct system may be used only with live steam.

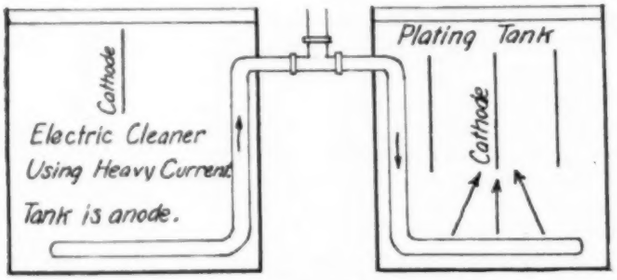


FIG. 11. SHOWING HOW UNDESIRABLE CURRENTS MAY LEAK ALONG UNINSULATED STEAM PIPES.

The method of applying the steam in this system is simply to run it in through two pipes, one on each side of the tank, at the bottom, each pipe having a number of ⅛-inch holes spaced at intervals of about 1 inch or so, throughout their length. These holes should be placed on the underside of the pipe. If they are on the upper side, then when the tank is not being used, sediment from the solution which settles on the bottom of the tank is likely to plug up some of the holes. When the steam valve has been shut off in such a system, the steam trapped in that part of the pipe between the steam valve and the tank will be condensed, the pressure will be reduced, and the pipe will be sucked full of the solution. Accordingly, if there is a very great distance between the steam valve and the tank, a small relief valve should be attached to the pipe near the tank, and this should be opened after shutting off the steam.

The pipes used should be wrought iron or mild steel. Brass or copper pipes are inadvisable, as when they are in contact with the steel of the tank, an electrolytic couple is set up, with the brass or copper at the higher potential, and the brass or copper will be dissolved. In this connection, it might be mentioned that any articles of copper, brass, or any other metal whose potential is above that of iron in cyanide solutions, if dropped to the bottom of the tank, will in a comparatively short time, be destroyed by electrolytic action. In one case, a brass valve used on an electric cleaner tank was eaten away in about three weeks from just such action.

Where steam is used to heat several tanks, it is important that the pipes should be insulated between the tanks. If this is not done, current may leak from one tank to another as illustrated in Fig. 11, and may cause the work to be plated at a much higher current density than the ammeter is registering, with a burnt deposit as a result. The case illustrated in Fig. 11 is perhaps an extreme one; but such effects are often brought about to a greater or less degree. Insulating joints for steam pipes may be bought from plating supply houses, and these should be used to obviate such difficulties as mentioned above.

STONE TANKS.

Plating tanks are also made of slate. Slate is easily obtained in practically any thickness and any size desired. The tanks are made by grooving and bolting together the slabs of slate, and sealing the joints with rubber packing, melted sulphur, or a cement composed of glycerine and litharge. Slate is quite rapidly attacked by concentrated acids; but dilute acids act upon it very slowly. For plating tanks of any size, the material is generally considered too expensive and also too heavy.

Stoneware tanks are also quite expensive. They have no seams to leak and for this reason, they are quite desirable for such solutions as silver and gold, where the expense of the tank is of relatively little importance.

In a few cases, tanks of concrete have been used. Such tanks are not suitable for acids, but withstand caustics fairly well. They may be waterproofed by applying a fairly dilute solution of water-glass, allowing to stand for about 24 hours, then washing off, and repeating this process several times. The sodium silicate reacts with the excess of lime in the concrete to form a dense insoluble coating of calcium silicate, and soluble sodium hydroxide, which should be washed out.

(To be continued)

EMBARGO ON ALUMINUM.

The Secretary of the Ministry of Munitions, England, forwards the following notification:

In pursuance of the powers conferred on him by Regulation 30A of the Defence of the Realm (Consolidation) Regulations, 1914, the Minister of Munitions hereby orders that the war material to which the regulations apply shall include war material of the following classes and descriptions, namely:

> Aluminum and alloys of aluminum, unwrought and partly wrought, including ingots, notched bars, slabs, billets, bars, rods, tubes, wire, strand, cable, plates, sheets, circles, strip. Granulated aluminum, aluminum powder, "bronze," "flake," and "flitter."

The Order dated December 7, 1915, published in the *London Gazette* of the same date, relating to all kinds of aluminum and alumina is hereby cancelled.

All applications for a permit in connection with the above Order should be addressed to the Director of Materials, Ministry of Munitions, Armament Buildings, Whitehall Place, S.W., England.

NEW JAPANESE ZINC PLANT TO ENTER FIELD.

A zinc factory which is being built at Hikoshima, in the Shimonoseki Straits, by the Suzuki Shoten of Kobe, Japan, will be completed in a few weeks. Operations were commenced in April, 1916, and 2,500 hands have been employed. When the factory is completed, the number of employees will be increased by 1,500. The ore will be chiefly from Australia and Asiatic Russia, and will first be sent to a refinery at Chofu, which is also owned by the Kobe firm.

CADMIUM IN SPELTER*

Some Information Regarding the Effects of Cadmium on Copper Alloys.

By Walter Renton Ingalls (U. S. A.)

For some purposes cadmium in spelter, even a small percentage of it, is deleterious. In spelter that is to be used for slush castings there is no doubt about it. In spelter for brass-making there is not the same certainty. For brass that is to be cast and machined, the adverse effect of cadmium is probably overestimated, and it may not be adverse at all. For cartridge brass it is objectionable. In many cases where cadmium is objectionable it is not unlikely that there is hair-splitting about hundredths of a per cent. that is unnecessary. Military engineers and others who specify respecting brass should look carefully into this. The extraordinary differences in price that have lately prevailed, and still do to a less extent, between what in America are classified as high-grade, intermediate, brass-special and prime western (common) spelter do not look right.

The sampling of spelter is more or less of a haphazard process and has a bearing on this subject. American brass-makers follow a time-honored practice of sampling a carload (about 50,000 pounds of spelter in 820 to 960 slabs) by drawing 10 slabs at random, and that practice has within a few weeks received the official endorsement of the American Society of Testing Materials. This was the outcome of controveries that have arisen over that matter. The following, from an editorial by the writer,† may be appropriately quoted here:

"An interesting and entirely friendly controversy respecting the proper sampling of spelter recently arose between a well-known seller and an important brass manufacturer. The seller agreed to furnish two carloads of brass special spelter guaranteed to contain not more than 0.6 per cent lead. The cars having arrived at the buyer's works, he drew 10 slabs from each and finding the assays to exceed slightly the stipulated lead content, called for an adjustment. The seller sent out the agent of a prominent firm of public assayers to draw a new sample of 30 slabs per car. The buyers refused in advance to abide by the result of this.

"The issue was clear-cut. The seller claimed that he should be required only to deliver a carload of spelter whereof the average should conform to the guarantee, that in determining the average a large sample is more desirable than a small one and that the conditions of producing spelter do not permit the insurance of uniformity in slabs except in the case of high-grade spelter.

"The buyer, on the other hand, contended that the conditions of brass-making whereby the spelter is introduced into the melting pots in small lots necessitate uniformity, that its method of sampling during many years had been to draw only 10 slabs at random out of a carload and that no other system would be safe for it.

"On none of these points have there been any official rulings. The specifications of the American Society for Testing Materials require as to sampling only that at least 10 slabs shall be drawn. In the contract between buyer and seller in this case, and probably in most of such cases, there was no contractual understanding.

"In the present instance the assays were made with the following results, those marked B being made by the buyer and those marked S by the public assayer acting in behalf of the seller:

Party.	Car.	No. Pieces.	Lead, p c	Iron, p c
S	1	30	0.491	0.013
S	1	12	0.644	0.012
B	1	10	0.737	0.013
S	2	30	0.758	0.021
S	2	12	0.616	0.023
B	2	10	0.667	0.021

"The interesting thing about these assays was that in the case of Car 1 the 30-slab sample showed lower lead than the 10-slab, while in the case of Car 2 it showed higher. The discrepancy between the 10-slab and the 12-slab samples is also noteworthy. Manifestly there was irregularity in the composition of the slabs.

"As to the merits of the case there is a good deal to be said for each side. The brass-maker needs uniformity of the product he is buying. On the other hand, the smelter can hardly insure it by his present methods unless he be distilling high-grade ore that is already uniform. In distilling ore containing lead, the proportion thereof that goes over with the zinc is governed primarily by the temperature of the retort, which varies in different parts of the furnace. In drawing the spelter, the kettle into which it is received holds but a relatively small quantity and the respective pourings from the same drawing may easily vary in composition, especially when lines are drawn so narrowly as they are as to lead content.

"Apparently there are two things that need to be done: (1) Sellers in offering a guarantee should specify as to whether it pertains to average of a carload or to any 10 slabs selected at random. (2) If buyers must have uniformity, smelters must insure it by pouring and mixing their product in large pots or melting furnaces before casting the slabs to be marketed."

It need only be added that if the zinc smelter be obliged to guarantee practically every slab of his production, the consumer must pay for it; or if he must introduce the new process of remelting and mixing, that also must be paid for.

Now, what are the conditions of the zinc smelter with regard to making spelter low in cadmium? His conditions are easy only when his ore is free from cadmium, but the only ore of that class produced in large quantity anywhere in the world is that of the Franklin mine of the New Jersey Zinc Company. That ore is also free from lead, and that company is the only one that can produce high-grade spelter by a single and simple process of smelting. The bulk of the world's zinc ore contains cadmium, and that metal being metallurgically similar to zinc distils with the zinc and contaminates the spelter, as also does lead.

In America brass-special spelter is made by reserving the first of the three daily drawings of spelter. This metal having been distilled before the furnace has attained its maximum temperature is relatively low in lead, but in it there is a concentration of cadmium, which being volatile at a lower temperature than zinc comes over chiefly in the first stage of the distillation. Theoretically it should be possible to control the temperature of the distillation so as to cut off both the cadmium-bearing spelter and the lead-bearing spelter, obtaining a high-grade spelter between, but practically that would be quite out of the question. It is, however, easily possible to get a high-grade spelter, low in cadmium, by the redistillation of common spelter with proper control of the temperature and separation of the first distillate.

A good deal of the high-grade and intermediate spelter that America has sold to Great Britain at fancy prices during the last eighteen months has been redistilled common spelter. Great Britain ought to have bought common spelter and redistilled it herself.

In conclusion, it may be remarked that the electrolytic process of zinc extraction affords an easy means for the separation of cadmium. It should be borne distinctly in mind that the electrolytic process is going to be commercially applicable only under some limited specially favorable conditions and is not going to drive zinc smelting

*Paper read at a meeting of the Institute of Metals on September 20, 1916, London, England.

†Engineering and Mining Journal, July 8, 1916.

out of the world's arts. However, the electrolytic zinc production that is likely to endure should go a long way toward meeting the demand for high-grade spelter, and especially spelter low in cadmium. And, furthermore, inasmuch as the electrolytic cathodes have to be remelted in large furnaces, the slabs cast therefrom should be more uniform in composition than those coming from the small tapping kettles of the retort furnace, the Bertha and Horsehead brands being excepted because of the natural purity of the ores from which they are made.

THE ELECTRO-DEPOSITION OF NICKEL*

Some Experiments Performed with the View of Establishing a Standard Bath for the Nickeling of Zinc and an Explanation of the Function of Boric Acid.

By L. D. Hammond†.

THE DIRECT NICKELING OF ZINC.

Attention is being attracted to the direct deposition of nickel on zinc owing to the increased use of zinc to cover tables, kitchen cabinets, etc., and to its use in die castings, which are largely zinc. Langbein[1] states that "sheet zinc directly nickeled does not show the warm, full tone of sheets previously coppered or brassed. The nickel deposit on brassed sheets shows a decidedly whiter tone than on copper sheets, and brassing would deserve the preference if this process did not require extraordinary care in the proper treatment of the bath, the nickel deposit readily peeling off." Experiment has shown that all of the baths proposed for the direct nickeling of zinc give a deposit of yellowish nickel, but that this can be remedied by the addition of acid to the bath.

The direct nickeling of zinc present difficulties not encountered in the deposition of nickel upon copper or brass, due to the fact that zinc is more electro-positive than nickel, so that, when the zinc is placed in the electrolyte, a non-adherent deposit of black nickel immediately appears, which causes the metal, afterward deposited on the zinc by the current, to peel. In order to avoid the trouble caused by this deposition by immersion two methods are in use at present. One is to coat the zinc first with a more negative metal or alloy, such as copper or brass, which can be done in an electrolyte containing potassium cyanide, since the copper or brass becomes more positive in such a solution, and the difference between the single potentials of zinc and copper is so small that deposition by immersion does not occur. However, this method involves a second operation which, from a commercial viewpoint, makes the process more expensive. The second method is to subject the article to be plated for about thirty seconds to an initial current density much higher than that regularly employed. This is called "striking."

In looking over the electrolytes that have been proposed[2] for the direct nickeling of zinc, it is seen that they are all low in nickel content, which permits only a small curent density to be employed, and that other substances have been added, such as magnesium sulphate, potassium or sodium citrate, phosphates, bisulphites, etc., which are for the purpose of making the zinc less positive to the electrolyte. It is the object of this part of the paper to report results of study made first, to find out the purpose of these added substances; second, to see if they make the zinc less positive; and, third, to see if nickel cannot be directly deposited more rapidly than from the baths already proposed.

To see if there was any change in the relative potentials of the zinc and nickel it was decided to measure their potentials in the various baths proposed for the direct nickeling of zinc. The Poggendorf compensation method was employed together with the normal calomel electrode, the potential of which was taken as —0.56 volt. The measurements were all made at room temperature.

Table I.

Electrolyte		Metal	Single Potential
Nickel sulphate	40 gm.		
Sodium citrate	35 gm.	Ni	0.205
Water	1,000 cc.		
Same electrolyte		Zn	0.55
Nickel ammonium sulphate	56 gm.		
Magnesium sulphate	26 gm.	Ni	0.20
Water	1,000 cc.		
Same electrolyte		Zn	0.498
Ammonium chloride	37.5 gm.		
Nickel chloride	37.5 gm.	Ni	0.28
Water	1,000 cc.		
Same electrolyte		Zn	0.51

Table I shows that, in the baths proposed for the direct nickeling of zinc, the single potentials of both nickel and zinc have practically the same values as in normal solution of their salts. The zinc is not less positive in these baths and should precipitate nickel by immersion. In all these baths it was found that such was the case. Sodium citrate slows down the rate with which the deposition by immersion takes place, and it is to this effect that its beneficial action is due.

It was noted, in the baths proposed for the direct nickeling of zinc, that if a piece of zinc were immersed in the electrolyte, it would finally be coated by immersion; therefore, it was decided to determine how the rate of deposition by immersion was affected by changes of temperature. For this purpose a bath proposed by Pfanhauser[3] was chosen which had the following composition:

Nickel sulphate	40 gm.
Sodium citrate	35 gm.
Water	1000 cc.

Strips of zinc were polished, cleaned in the electric cleaner, immersed in the electrolyte, and the temperature, time and the character of the deposit noted.

The data of Table II show why hot solutions, which have been so advantageously employed in nickeling copper, for example, cannot be used in the direct deposition of nickel on zinc, since the rate of deposition by immersion increases with increase of temperature. Experience has also shown that this rate, even at ordinary temperature, is increased with the increase of concentration of nickel salt in the electrolyte. This fact explains why all the baths proposed for the direct nickeling of zinc are low in nickel.

*From a paper read at the New York meeting of The American Electro-Chemical Society held in New York September 28-30, 1916.

†Laboratory of Applied Electro-Chemistry, University of Wisconsin.

[1] Electro-deposition of Metals, p. 298.

[2] Watts, Trans. Amer. Electrochem. Soc., 23, 149 (1913).

[3] Elektroplattirung, W. Pfanhauser, 1900.

TABLE II.

Temp.	Time	Deposit
0°	15 min.	None.
0°	30 min.	None.
0°	45 min.	Slight coloration.
18.5°	15 min.	Slight coloration, hardly as much as above.
18.5°	30 min.	Decided yellow color.
18.5°	45 min.	Black brown.
45°	10 sec.	None.
45°	30 sec.	Perceptible color of yellow.
45°	60 sec.	Decided yellow.
60°	10 sec.	Perceptible yellow.
60°	20 sec.	Yellow.
60°	30 sec.	Decided yellow.
75°	10 sec.	More than perceptible.
75°	20 sec.	Decided yellow.
75°	30 sec.	Brownish black.
90°	5 sec.	Decidedly perceptible.
90°	10 sec.	Yellow.
90°	15 sec.	Brown.
90°	20 sec.	Blue black.

In examining the conditions necessary for the direct deposition of nickel on zinc, the following data show the relation between the character of the deposit and the composition of the electrolyte and current density employed. Twenty different electrolytes were studied, in which the nickel sulphate varied in concentration from 40 gm. per liter to a saturated solution. Some of these were used without the addition of any other substance, while in other solutions nickel chloride was added. Still others contained varying amounts of nickel sulphate and nickel chloride acidified separately with various acids. The current density varied all the way from 0.2 amp. to 15 amp. per square decimeter. These experiments show that nickel can be deposited directly on zinc from an electrolyte of any concentration of nickel which is acid in reaction and contains nickel chloride to secure proper anode corrosion. It is only necessary to vary the current density employed, which must be increased as the concentration of nickel increases. It is not absolutely necessary to add sodium citrate or magnesium sulphate to the electrolyte, although the presence of the former is advantageous.

Owing to the more electro-positive nature of zinc, it is more difficult to deposit a good coating of nickel on this metal than on a more negative metal, such as copper, on account of the trouble caused by the deposition of nickel by immersion, which causes the electrolytic deposit to peel. It has therefore been thought necessary to add substances to the electrolyte to make the zinc less positive. Single potential measurements, however, show that the potential of the zinc has not been changed, and experiment has shown that these substances do not alter the character of the deposit. Zinc may be nickeled directly from the same bath used for copper or for brass, the only difference being in the current density which it is necessary to employ. Zinc requires a higher current density, especially at the beginning of the electrolysis, to coat the metal quickly with nickel so as to minimize deposition by immersion. The greater the concentration of nickel in the electrolyte, the greater must be the initial current density used. It has been found, however, that alkaline citrates, tartrates and malates reduce the initial current density necessary to be employed with concentrated nickel solutions.

An electrolyte of the following composition was prepared.

Nickel Sulphate ($NiSO.6H_2O$)	120 gm.
Nickel Chloride ($NiCl_2.6H_2O$)	15 "
Boric Acid (H_3BO_3)	30 "
Water (H_2O)	1000 cc.

This bath may be used to give a deposit on zinc, copper, brass or iron. In order to deposit on copper, a current density varying from a few tenths of an ampere to three or four may be used, but to deposit on zinc, not less than 3 amp. can be employed, which will produce a coating of nickel on a piece of zinc in one-twelfth of the time required for Pfanhauser's bath.

While excellent results were obtained from this bath when flat pieces of zinc in the form of strips were used, it is possible that, when zinc objects or irregular form are to be plated, black streaks may be formed on those parts of the object which may be subjected to a lower current density. In order to overcome this difficulty, the following new bath is proposed for the direct and rapid nickeling of zinc:

Nickel Sulphate ($NiSO.6H_2O$)	240 gm.
Nickel Chloride ($NiCl_2.6H_2O$)	15 "
Boric Acid (H_3BO_3)	30 "
Sodium Citrate ($2Na_3C_6H_5O_7.11H_2O$)	175 "
Water (H_2O)	1000 cc.

This bath has been operated at current densities varying from 0.5 to 7 amperes per square decimeter and satisfactory deposits were secured. Pure electrolytic nickel anodes should be used.

In all the baths for the direct nickeling of zinc there is a lack of acid, except in those proposed within the last few years, which contain boric acid. However, this is such a weak acid that there is no appreciable action on the zinc even on open circuit. It has been shown, however, that nickel can be deposited directly on zinc from electrolytes strongly acid in reaction. Not only have fairly concentrated solutions of organic acids been used, but the strong mineral acids also.

FUNCTION OF BORIC ACID

Quite recently there was published an article by E. S. Thompson, purporting to give an explanation of the function of boric acid. That the article was written by one who is evidently unacquainted with even the rudiments of chemistry and electricity is shown by the following excerpt: "We will consider a solution composed of nickel sulphate, sodium chloride and boric acid. As the electric element forces oxygen out at the anode it necessarily forms a new combination with the hydrogen, and perhaps the nickel. But as we have boric acid there as a catalytic agent, it takes charge of the electric current and forms a combination without itself undergoing decomposition, and forces the sulphuric acid out of its combination with nickel. The chlorine which has been forced out of the sodium rushes in to take the place of the boric acid and forms chloride of nickel, having electro-hydrogen (we will call it that) as its solvent. . . . The oxygen is forced out of the solution at the anode, its volume being exactly equal to the volume of electricity which has entered the solution. Then the boric acid takes charge of the electricity for an instant and forms a combination with the nickel sulphate. . . . It will be seen by this that the handling of these solutions must be done by a man who understands their actions."

Having succeeded in securing satisfactory deposits of nickel from electrolytes containing small concentrations of the inorganic and organic acids, it seemed probable that the action of boric acid was simply to maintain a faint acid reaction in the electrolyte, which is a condition essential to a good deposition of nickel.

Results of experiments with baths containing boric acid show: An acid reaction to the electrolyte is necessary for a good deposit of nickel, since those baths which

were neutral in reaction all failed to give a good deposit. Since good deposits were secured from solutions acidified separately with sulphuric, boric, lactic, acetic, nitric, phosphoric, oxalic, tartaric, citric, succinic, benzoic, salicylic and hydrochloric acids, it is demonstrated that boric acid has no function in the electrolyte which is different from that of any other acid. It simply maintains in the electrolyte a small concentration of acid, which is necessary to secure a good deposit. Owing to the fact that it is fairly soluble, and to the fact that it is a very weak acid, it lends itself to practical use better than most of the acids listed above. To show how weak boric acid is, it is only necessary to recall the well-known fact that a solution saturated with boric acid at room temperature may be dropped into the eye with impunity. Boric acid, then, simply acts in the capacity of a reservoir for keeping up a constant but small concentration of hydrogen ions in the electrolyte. In so far as their effect on the properties of the deposited nickel is concerned, hydrochloric or sulphuric acid could be substituted for the boric acid, but since the hydrogen ions in the electrolyte are gradually plated out, these strong acids, at the concentrations which must be employed, are already completely ionized and so cannot furnish more hydrogen ions to the electrolyte as the very weak boric acid can do. In this fact lies the only difference in the function of boric, sulphuric or hydrochloric acids in the plating bath, except that, in the case of hydrochloric acid, the chloride increases anode corrosion.

For general nickel plating purposes a bath of the following composition is proposed:

Nickel Sulphate ($NiSO_4.6H_2O$)	240 gm.
Nickel Chloride ($NiCl_2.6H_2O$)	15 "
Boric Acid (H_3BO_3)	30 "
Water (H_2O)	1000 cc.

These salts are readily soluble at ordinary temperature and the boric acid may be readily dissolved by raising the temperature of the water slightly, although the acid will dissolve at room temperature. At this temperature the bath may be operated at any current strength between 0.5 amp. and 10 amp. per sq. dm., and by raising its temperature to 75°, it is possible to employ current densities as high as 33 amp. per sq. dm., as Watts has recently demonstrated. At room temperature the specific resistance of this electrolyte is 23.54 ohms per centimeter cube.

GENERAL SUMMARY

1. Nickel can be deposited directly on zinc from baths used to deposit nickel on more electro-negative metals by employing a higher initial current density than is used with the more electro-negative metals.

2. Nickel has been deposited directly on zinc from an approximately half normal hydrochloric acid solution to which 120 gm. per liter of nickel sulphate were added.

3. The beneficial action of sodium citrate in the baths for the direct nickeling of zinc has been found to consist not in changing the potential of zinc but in decreasing the rate of deposition by immersion. Sodium potassium tartrate and sodium malate have a similar action but they do not permit the use of as high a current density as the citrate bath.

4. A new bath for the rapid and direct nickeling of zinc is proposed.

5. The use of pure nickel anodes and the use of nickel chloride to secure anode corrosion, instead of any other chloride, is advocated.

6. The use of nickel sulphate in the electrolyte instead of nickel ammonium sulphate is advocated.

7. The function of boric acid in the electrolyte has been explained.

CORROSION OF GALVANIZING POTS

Recently, a series of experiments were undertaken by the firm of Julius Pintsch, London, England, to determine what action a hot galvanizing bath might have on steel sheets of varying composition. The sheets were analyzed, metallographically examined, and samples were hung in the bath of zinc for a period of eight hours, during which time the temperature of the bath was as near as possible kept constant. Several samples were taken from each sheet and were each exposed to the influence of the molten zinc for a period of eight hours, but the temperature of the bath was maintained at a different point for each of the several tests. The loss of weight which took place per unit of surface during one hour proved the solubility of the iron in heated zinc at various temperatures.

Some of the conclusions reached were: That irregular texture increases the solubility; a high percentage of carbon in the iron does not increase the solubility; in a superheated bath the carbon reduces the solubility in a not inconsiderable degree. The difference of 0.025 to 0.009 per cent. in the phosphorus content of the iron is scarcely noticeable in the solubility of the iron at the usual temperatures of the galvanizing bath. In the superheated galvanizing bath the higher phosphorus content has a very unfavorable effect. The effect of a higher or a lower percentage of manganese on the solubility of the iron is not apparent. A higher silicon content, however, seems considerabl yto increase the solubility.

It was also noted during the experiments that the temperature of the zinc bath has a great influence on the solubility of the iron. This influence far exceeds all others, and explains the results obtained in practice where the walls of new pots which have only been used for a short time become corroded through and through. The experiments established the fact that the solubility of the iron in hot zinc grows with the increasing temperature of the galvanizing bath, until about 500° C. has been reached. At this temperature a gradual increase in the solubility sets in, which is followed by a further considerable increase if the bath is heated still more. The weight of iron dissolved in a given time may be about nine times as great at a temperature of about 500° C. and more than thirty times as great at 530° than at a temperature below 490°. A continuous temperature of 500° and more must, therefore, lead to a rapid destruction of the pot.

The difference in the composition of the iron of which the pot is constructed is unimportant as compared with the influence of the temperature of the bath on the durability of the pot. The causes of a rapid corrosion of a galvanizing pot are generally due to an overheated bath.

CANADA PRODUCES ELECTROLYTIC COPPER.

(United States Consul William E. Alger, Fernie, British Columbia, August 22.)

The first pure copper known to the trade as electrolytic copper was turned out at the new copper refinery in Trail, British Columbia, on August 20, 1916.

The electric current was switched on to some of the tanks containing the copper anodes, and the pure metal, the gold and silver values being left in the slimes, was the result. In the near future a daily production of 10 tons is expected. This is the only place in Canada where pure copper has been made.

KEEPING WORKMEN HEALTHY*

SOME PICTURES ILLUSTRATING THE VALUE OF GOOD HEALTH TO EMPLOYER AND EMPLOYEE.

"How am I going to get that work done by next week with Ellis out sick?"

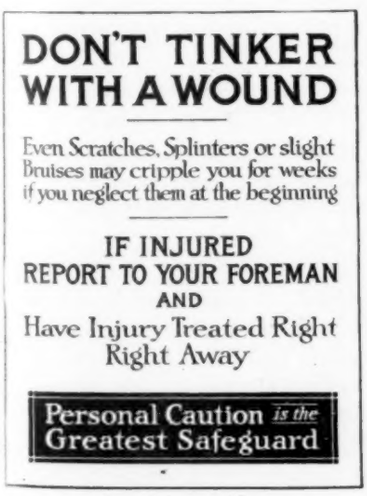
Healthy workmen enjoy their recreation and rest.

The expert's examination helps the employee to evade serious, though unsuspected, diseases.

Foreman:—"What's the matter with your throat, Tom?"

"The chief disease that reigns this year is folly."

"No appetite! Better see a doctor about it right away. Remember the kiddies, old man!"



A pertinent reminder.

Following the shop doctor's advice.

Shop posters help.

*From the June-July, 1916, Spirit of Caution, published by the National Affiliated Safety Organization, Lynn, Mass.

EDITORIAL

OLD SERIES
Vol. 22, No. 10

NEW YORK, OCTOBER, 1916

NEW SERIES
Vol. 14. No. 10

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS.
Published Monthly

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

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CONTENTS

FOUNDRYMEN'S CONVENTION

The convention of the American Foundrymen's Association and the American Institute of Metals and the exhibition of foundry apparatus held under their auspices which came to a close in Cleveland, Ohio, on September 16, 1916, set a new mark for such occasions. As told in the opening pages of this issue of THE METAL INDUSTRY, the attendance at both the scientific sessions and the exhibition exceeded all previous meetings. The experiment of holding the exhibition by the allied associations proved to be a happy solution of what was becoming a serious problem.

The papers read and discussed at the various sessions of both societies constitute by far the best program yet carried out. The subjects treated are many and varied and the questions that they have brought up for settlement will take years of study and work before they are finally disposed of. In support of this statement we might cite the work that the Institute of Metals has undertaken in conjunction with the United States Bureau of Standards at Washington, D. C., relating to standard methods of preparation of samples for the analysis of metals and alloys. There is also the work being done on the gun metal alloy of 88 copper, 10 tin and 2 zinc, which the Bureau has already presented two papers upon. Another very important piece of work is the investigation being carried on as to the causes of season cracking of metals. This work resulted from the failure of "manganese bronze" in both wrought and cast form used on the Catskill Aqueduct system of water supply for New York City. When these investigations are all finished it is hoped they will clear up the doubt now existing regarding the fitness of this alloy for an engineering material to take the place of steel.

A few words regarding the conduct of the meetings may be in order here. The idea of holding only morning sessions was a good one, the only drawback being that too much good material in the way of papers was allotted to each session. It might be better to have fewer papers and more discussion so that salient points could be brought out. Those papers whose authors were not present might have been read or their meaning explained so that some comment could be had. But on the whole everything went through very nicely and the officers are to be congratulated upon the successful carrying out of their plans.

The experiment of devoting a session to foundry practice as announced by ex-President CLAMER at Atlantic City last year was carried out, and Wednesday, September 13, stands out as the red letter day of the 1916

meeting. The attendance was remarkable for its size and interest, the room was filled to standing room only and the discussions were terminated only by lack of time. The success of this session would warrant the holding of two such sessions next year, that is, a morning and afternoon session on the same day so that the interrupted discussion of the morning could be resumed after lunch.

One of the most important questions that the Institute of Metals was called upon to settle was the proposal to merge the Institute with the American Foundrymen's Association. In this connection the report of Secretary CORSE published in this issue of THE METAL INDUSTRY shows clearly why the invitation was declined. Any society that can not only hold its membership in the face of a raise in dues but can actually show an increase and also can muster twenty-five per cent. of its membership at its convention is surely worthy to stand alone.

We believe the executive committee which had the matter in hand did just the right thing when they declined the invitation of the sister society. There is room in this country, plenty of it, for two metal societies. Better be a small body, if need be, but complete in itself and covering its chosen field with thoroughness than to be a part or section of a larger organization. In England there is the Iron and Steel Institute and the Institute of Metals, and there is really no reason why two such societies should not be equally successful here.

Furthermore the Institute of Metals was originally formed as an off-shoot of the American Foundrymen's Association and at the present time bids fair to outnumber in membership the parent organization, and this being so it does not seem that there is much to gain by merging with the older body. As Vice-President Wallace said, the Institute was now well fulfilling the purpose in view on its organization. That it had proved to be an invaluable meeting ground for men interested in all phases of the complicated metallurgy of alloys; a meeting ground where the engineer and scientist meet the metal founder. This will then lead to closer co-operation between the foundryman and the engineer and this is just what is needed. A glance at the membership list of the Institute of Metals will show how the Institute is performing its destiny and for this reason should continue alone on its appointed way.

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY.

PLATING RACKS

TO THE EDITOR OF THE METAL INDUSTRY:

Since writing the article "Resisto Plating Racks and Hooks," which was published in THE METAL INDUSTRY for June, 1916, a substitute for the objectionable tape has been produced by the manufacturers of Resisto, and is designated as First Coat Resisto. It forms a very tough adhesive coating which stands the required tests, and the succeeding coatings of Regular Resisto adhere firmly. By eliminating the tape a much smoother job is produced and the time required to finish a rack is considerably less. A sufficient amount of Resisto should be used so that the racks or hooks may be immersed up to the cathode hooks, applying as many coats as desired allowing each coat to dry before applying the next; the same course being followed with "First Coat" and "Regular Resisto." After the final coat is dry the metal work hooks may be bared with a file, just sufficient to allow electrical contact with the work.

FRANKLIN W. HOBBS.

Bangor, Me., September 20, 1916.

INVESTIGATION OF THE DEPOSITION OF SILVER

TO THE EDITOR OF THE METAL INDUSTRY:

The deposition of silver from a cyanide solution is a phase of electroplating that has not been studied as much as its importance would warrant.

The nature of the deposit and conditions affecting it have been hardly touched upon in a scientific manner. However, this important branch of electroplating has been approached in several ways. Such an article as "Some Unsolved Problems of the Electroplater,"* by George B. Hogaboon, points out the condition and a list of the unsolved problems in that article emphasizes how "scientifically at sea" we electroplaters are. The possibilities of discovery by research are apparent when Bulletin No. 52 on "Electrotyping Solutions" by the Bureau of Standards, Washington, D. C., is studied. General principles laid down in that particular research are fundamental in electroplating, and should be thoroughly appreciated by electroplaters.

It is hoped that a specific study of deposition of silver from a cyanide solution on different base metals may be possible by the Bureau of Standards in the near future.

H. J. BLANCHARD,
Foreman Plater, Wm. A. Rogers, Ltd.

Niagara Falls, N. Y., September 25, 1916.

*THE METAL INDUSTRY, April, 1916.

NEW BOOK

Heat Treatment of Tool Steel—Second Edition 1916. By Harry Brearly. Size 6 by 9 inches. 224 pages, including index. 110 illustrations. Bound in cloth. Published by Longmans, Green & Company. Price, $3.50. For sale by The Metal Industry.

In this book the author has taken the opportunity to treat more fully the alloy steels generally and high speed steels in particular. The present work, it is hoped by the author, will enable the toolmaker to improve his product and locate and avoid some of the troubles. By careful study of the information given in the work he may at any rate easily convince himself that the destiny of his tools is not altogether in the hands of the steelmaker, and that not all defective and broken tools can justly be ascribed to bad steel, but are often due rather to various causes which may be detected and remedied.

The work is made up of 15 chapters, the titles of which are as follows: Structure and Classification, Crucible Steel—Raw Materials, Properties of Ingots, Fractures and External Appearances, Forging Tool Steel, Annealing Tool Steel, Physical Changes in Steel on Heating and Cooling, The Hardening of Steel, Tempering and Straightening, Hardening Typical Tools, Defective Tools, Hardening Plant, Pyrometers, Alloy Steels. There is also an appendix which devotes considerable space to the history of iron and steel.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE.

CASTING

Q.—We understand that concerns casting pewter and other similar metals have a process for finishing the surface of a new mold, so that the metal will not stick to it, and, further, so that the metal will flow easily to all parts of the mold. Have you any information as to such methods of treating these molds?

A.—There are several methods used for coating molds for casting pewter, zinc, britannia metal and antimonial-lead alloys. Such materials cause the metal to flow freely and prevent the metal sticking to the mold and in other words act the same as a parting compound in sand casting.

The following are the materials and methods used: First—Coat the mold over with French red chalk or smoke the mold on the inside over a turpentine flame. Second—Heat the mold up to 300 degrees, then apply a very thin coating of jewelers' gold rouge mixed with water with a soft brush. Or heat the mold up to 300 degrees and then apply a mixture of polysulphide or sulphuret of potassium. Mix either of these chemicals in about a ½ pint of water and coat with a soft brush. In applying the rouge go over very lightly so the details will not become clogged.

Sodium silicate may be applied to stop off certain parts of the mold or to coat around the mold in the vicinity of the gate so that they can be broken off readily. This information given above applies to bronze molds, but may be used upon iron molds also.—C. H. P. Problem 2,354.

COLORING

Q.—Can you advise us of a process which will give us a better color on our red brass castings? It is our desire to obtain a richer copper color on these goods by an acid dip. We make all our own castings, and we might also mention we do not maintain a plating department.

A.—To produce a better finish upon your goods you will have to resort to acid dipping, and the process is as follows: First—Remove sand, etc., by immersing the casting in an acid dip composed of 1 gallon of water and 1 quart of hydrofluoric acid and heated to 160 degrees Fahr. The heating can be done by the aid of lead steam coils. As the acid dissolves glass and silica the container should be of wood, preferably lead lined with burned-in seams and not soldered seams.

Second—After an immersion of from a half hour upwards the sand will be removed and the casting should be drained well and washed thoroughly in water to remove the sand loosened by the action of the acid.

Third—Prepare a bright acid dip as follows:

Aqua fortis, 38 per cent	1 gallon
Sulphuric acid, 66 per cent	1 gallon
Water	1 quart
Muriatic acid	2 ounces

Prepare in the order given, and after mixing let the dip stand for some time to cool. A few scraps of metal thrown in the acid will improve it; these scraps will all be eaten up by the action of the acid.

Fourth—From the second operation immerse the articles in the bright acid dip for a moment or two, then drain quickly and wash thoroughly in water.

Fifth—Prepare a dip consisting of 1 gallon of water and 4 ounces of cyanide of sodium or cyanide mixture. Immerse the castings, after washing from the bright acid dip, in the cyanide dip for a second and then rewash in water.

Sixth—Dry out by immersing the castings in boiling water to aid in the drying and prevent water stains. Add about a half ounce of black platers' compound, commonly known as whale oil soap, to each gallon of boiling water used.

Seventh—Where the castings are small and of an inferior grade of metal containing much lead, then it is advisable to tumble in the regular tumbling barrel, using water to which is added about two ounces of washing soda per gallon. This operation will remove the sand by friction.

Eighth—After tumbling wash and then immerse in the bright acid dip for a moment only, then proceed as in operations Nos. 5 and 6.—C. H. P. Problem 2,355.

DRAWING

Q.—In cold drawing or cupping rings out of flat steel we have been using mineral oil. The concern galvanizing these fittings for us has asked us to use only vegetable oil in this operation, if we can possibly obtain a cheap oil that will do the work. What do you consider the best and cheapest vegetable oil for this work and will it give the proper protection to our dies?

A.—Vegetable oils would be too costly for your purpose, and many of them have not the consistency necessary for metal drawing purposes.

A drawing mixture made up from lard oil and black whale oil soap, with the addition of water, would prove a satisfactory medium. The compound should be boiled so that it becomes the consistency of cream. There would be no difficulty in removing this soap mixture.—C. H. P. Problem 2,356.

DIPPING

Q.—Please give us a formula for making a solution to dip rings and other small articles in to preserve the color while gold soldering.

A.—We are of the opinion that if the rings or other small articles are immersed in an ordinary solution of sodium silicate (commercial water glass), and this coating allowed to dry for a short time, that the gold will be protected from the effects of the soldering flame.

If the water glass is too thick reduce with water, and it may be readily removed after soldering by immersing in boiling water. Starch paste with the addition of a small amount of gum arabic may also be used in a similar manner.—C. H. P. Problem 2,357.

FLUXING

Q.—Is ammonium chloride good for soldering sheet steel? If so kindly advise how to use it. We have some sheet steel to solder, and want to know what would be the best fluid to use.

A.—A soldering flux for steel that will not rust or blacken the steel is prepared as follows:

Denatured alcohol	6 ounces
Glycerine	2 ounces
Oxide of zinc	1 ounce

Mix thoroughly before using. Another flux that gives good results consists of mixing equal parts of olive oil and sal ammoniac. Chloride of tin mixed with vaseline should also make a good flux for steel. The steel should be clean and free from rust previous to soldering.—C. H. P. Problem 2,358.

GILDING

Q.—I have been adding bi-sulphite of soda to my gilding solutions, and it has turned a deep red color. Also, it has caused it to give a stained deposit. Would you tell me if the solution is spoiled or what can I add to make it work clear?

A.—By adding bi-sulphite of soda, which is an acid salt, in excess you have probably decomposed some of the cyanide. By

adding one or two pennyweight of cyanide of sodium per gallon of solution and one ounce of sodium phosphate the solution should again give a clear uniform color, providing the solution contains sufficient gold. In such an event a small amount of gold in the form of chloride or trisalyte gold will bring up the color. In the future use only sodium sulphite instead of the sodium bi-sulphite, as the former is a neutral salt and the latter, as stated, is an acid salt.—C. H. P. Problem 2.359.

MIXING

Q.—Will you please tell me how much tin there is in tin foil that comes in tobacco?

A.—A recent analysis of tin foil gave the following results:

Lead	91.10%
Tin	8.82%

Tin foil scrap may contain aluminum foil and for this reason should not be used in a high grade brass.—J. L. J. Problem 2,360.

OXIDIZING

Q.—Would you please inform us whether it is possible to etch or color an aluminum casting, such as is used in the spiders of steering wheels, to look as if it had been oxidized, and which etching or coloring will not begin to peel or chip off after being exposed to harsh weather conditions?

A.—Unlike copper, bronze, brass or zinc, which can be readily oxidized by ordinary methods, aluminum is a somewhat difficult metal to oxidize.

However, we would suggest that you try the following method and prepare a solution consisting of:

Water	1 gallon
Sodium cyanide	1 pound
White powdered arsenic	6 ounces
Caustic soda	1 ounce

Prepare the solution by dissolving the cyanide and arsenic in ½ gallon of boiling water; then add the remaining ½ gallon of water, and then add the 1 ounce of caustic soda. Maintain the solution at the boiling point and immerse the cleansed aluminum parts in it until a dark bronzed tone is produced. Then wash and dry and lacquer or varnish as desired.

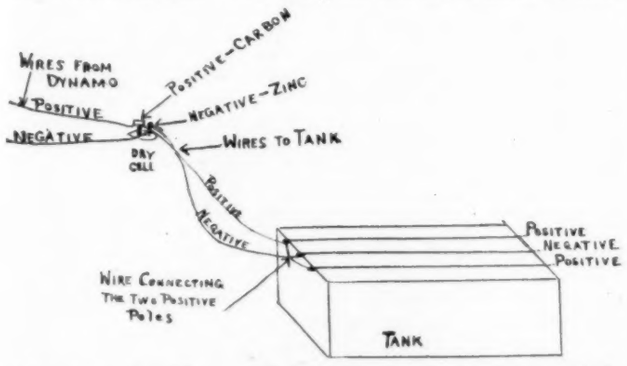
A gun metal tone is also produced by a modification of the black nickel solution. The bronze in this event is obtained in the regular method used for plating. We suggest that you try the following formula:

Water	1 gallon
Single nickel salts	4 ounces
Double nickel salts	2 ounces
Hyposulphite of soda	1 ounce
Saturated solution of copper sulphate,	½ to 1 ounce liquid measure

Use anodes of nickel at a voltage of 2 to 3. The copper sulphate solution is best added by testing, a little at a time, for an excess would give a copper tone to the aluminum.—C. H. P. Problem 2,361.

PLATING

Q.—We are trying to reduce our current to about one volt in our silver solution. Does this mean that the voltmeter should



show one volt when the bath is loaded or when the tank is empty. We are having trouble reducing the current to the right point, and though we have tried several switches, and know them to be all right, the meter either registers four volts or not at all when loaded; that is, it does not seem to register on any of the steps of the rheostat but the last one.

A.—The best results are obtained in a silver solution showing 1 to 1½ volts, irrespective of the amperage used. In other words, if a surface being plated requires only, say, 10 amperes at one volt for successful results, then a tank load that requires, say, 200 amperes, should still be at one volt. It is difficult to cut down the voltage when in excess on a rheostat, as usually when the amperes increase, the voltage also increases up to the voltage of the machine. It might be possible for you to procure a small transformer that can be placed in the circuit in your conducting wires leading to the silver solution. You might also try running your current through a dry cell as per sketch. This method proves very effective and will pull your voltage down to two volts or less.

The current passing through the dry cell will reduce the voltage irrespective of the ameprage.—C. H. P. Problem 2,362.

Q.—Can 9 and 18 karat gold be plated on copper coinage alloy consisting of 95 copper, 1 zinc and 4 tin? Also advise what solution to use and the current needed. I have some gold chloride on hand.

A.—Copper coinage alloys may be readily plated in 9 and 18 karat gold colors. A solution may be made up in the following manner:

Water	1 gallon
Gold trisalyte	¼ ounce
Sodium cyanide	⅛ ounce
Soda ash	⅛ ounce

Temperature, 180 degrees, and voltage, 2 to 2½. The karat color can be regulated by the addition of very small quantities of copper trisalyte.

As you state you have some gold chloride on hand, we would suggest that you use the following solution:

Water	1 gallon
Gold chloride	⅜ ounce
Sodium sulphite	¼ ounce
Phosphate of soda	½ ounce

Temperature, 180 degrees. For karat alloys, add copper in small proportions.—C. H. P. Problem 2,363.

STRIPPING

Q.—Kindly advise what is the most economical and successful method of stripping baked asphalt enamel from steel; also, the best solution and the method of removing paint or pigment enamels from steel. Would it be more economical to use a certain solution in connection with an electric cleaner? The black asphalt enamel is baked on at 400 degrees for three hours.

A.—The most successful method of removing japans of the baked variety or pigment enamels and paints is by electrolysis. For your purpose prepare the following solution in an iron tank to which is connected direct to the positive current from a 6-volt generator, or 8 to 10 volt if possible.

If no iron tank is available, then use a wooden tank, and rivet sheets of steel of equal dimensions to the sides of the tank to at least 1-inch brass or copper rods, connecting the positive current to these anode rods in the usual manner. In other words, the sheets of steel take the place of the iron tank. Now prepare a solution based upon the following proportions:

Water	1 gallon
Caustic soda	8 ounces
Soda ash	8 ounces
Water glass	1 ounce

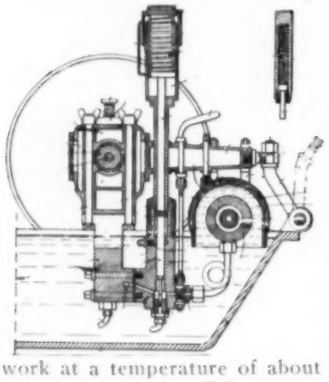
Heat the solution to 12 degrees Fahr., use a very high amperage and the hydrogen evolved will remove any of the materials designated in a minute or two. All insoluble material should be removed from the surface of the solution by skimming off as it develops. Solids should be removed from the bottom of the solution frequently.—C. H. P. Problem 2,364.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST.

1,193,859. August 8, 1916. **Pumping Apparatus for Molten Metal or Other Fusible Substances.** C. P. Bary, Paris, France, assignor to H. P. C. G. Debauge of the same place.

This invention has for its object a pump for delivering under high pressure molten metals at high temperatures such as molten lead, or alloys or other metals or fusible substances with a view to the production of wires, tubes, cable casings, and so forth with the aid of a suitable die or forming device.

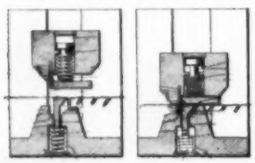


A pump such as is required for continuously forcing or extruding tubes of lead or wires, or casings, or coverings of this metal for cables, should work at a temperature of about 350 degrees C. This condition is of itself sufficient to necessitate the employment of very special means, as the purely mechanical portion of the pump, where friction takes place under relatively heavy forces, can only operate properly at a much lower temperature.

The pump which forms the subject of the present invention is constructed, as shown in cut, or combined in such manner that the purely mechanical parts are exposed to the atmosphere, while those which effect the continuous forcing of the molten lead are immersed in the molten lead container and are thus kept at a suitable temperature.

1,193,759. August 8, 1916. **Machine for Bending or Pressing Sheet Metal.** F. Briegel, Rock Island, Ill., assignor to H. E. Winters, of Davenport, Iowa.

This invention relates to a machine for pressing or bending sheet metal into a shape to form a sign board, adapted for holding cards, tickets or the like, having suitable characters thereon.



An important object of the invention is to provide a machine of the above mentioned character, so constructed that the primary and secondary steps in the process of pressing or bending the sheet metal, are approximately simultaneously performed.

A further object of the invention is to provide a machine of the above mentioned character, which will operate in a continuous and expeditious manner.

A further object of the invention is to provide a machine, as shown in cut, of the above mentioned character, which is simple in construction, inexpensive to manufacture, strong and durable.

1,195,955. August 22, 1916. **Composition of Matter for Soldering Cast Iron, Mild Steel, Aluminum and the Like.** W. R. Day, Bellingham, Wash.

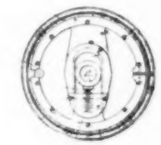
This patent covers the following composition:

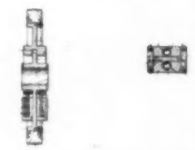
Lead	25 pounds
Tin	25 pounds
Zinc	50 pounds

That is, said metals are combined in the proportion of one part of lead, one part of tin and two parts of zinc. These metals are to be melted and thoroughly mingled while in a molten condition, and then molded in bars or rods suited for use as solder. The inventor has found that this alloy is very useful in soldering cast iron, and mild steel and aluminum are also readily soldered with it. To prepare the articles for soldering with this alloy, the surfaces must be made clean and bright, and then covered with stearic acid, or similar flux, when this solder applied with an extra hot soldering copper will be found to readily form an alloy with the surfaces to be joined. When soldering aluminum the surfaces should be brightened with the fatty flux in place. No other heat is required than that furnished by the hot soldering copper.

1,195,235. August 22, 1916. **Buffing Wheel.** Albert L. Kraus, of Peabody, Mass., assignor to himself, and Edward L. Millett, of Beverly, Mass., co-partners doing business under the firm name of Kraus, Millett & Co., of Peabody, Mass.

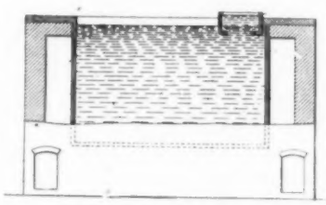
This invention relates to buffing machines, and more particularly to the wheels of such machines of the type which carry a removable buffing strip. The present application is a division of an application for patent for buffing machines filed on October 26, 1915. Serial No. 58,029. In the wheels of this type heretofore provided it is necessary to remove a part or parts of the wheel in order to take off the worn-out strip and to replace such part or parts after the new strip has been placed in position. This work of changing or renewing the buffing strip is often laborious, consuming considerable time, and it is the principal object of this invention to provide a wheel, as shown in cut, wherein the buffing strip can be readily removed and replaced without removal or replacement of any part or parts of the wheel.





1,195,376. August 22, 1916. **Process for Lead-Plating Metals.** J. C. McClintock and R. J. Shoemaker, Topeka, Kan.

This invention relates to a process for lead-plating metals, and consists in depositing lead in an adherent, uniform and non-porous coating on metals, more particularly iron and steel.

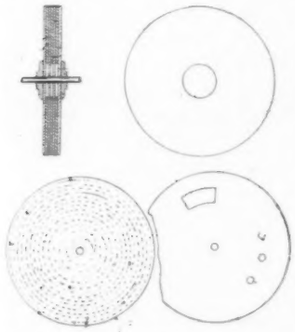


The process is based on the fact that metals, after a suitable cleansing of impurities on their surfaces, if dipped into molten lead at a proper temperature, as shown in cut, will become coated with lead, which adheres to the surface of the metal and form a non-porous and uniform coating. The process of lead-plating is greatly improved if the metal is dipped into a molten flux of zinc chlorid previous to its immersion into the lead bath.

The iron or steel to be coated with lead is cleaned from inorganic impurities, and particularly of oxids of iron, by immersing the iron or steel in a bath consisting preferably of equal parts by weight of commercial hydrochloric acid and water. This acid bath is maintained at a temperature of approximately 70 degs. F. Care must be exercised that the metal receive a thorough cleaning in the bath in order to remove all oxids, as any oxid remaining on the surface of the iron will make the lead coating porous, and, therefore, the metal will not be properly protected by the coating formed.

1,195,389. August 22, 1916. **Buffing or Polishing Wheel.** Carl B. Nehls, of Detroit, Mich., assignor to Felt-Sub Polishing

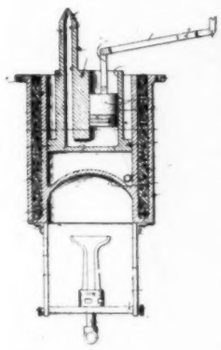
Wheel Company, of Detroit, Mich., a partnership consisting of Edward Gesser, Barney Hehls, Frank Shields and Carl B. Nehls.



The invention relates to buffing or polishing wheels, and it is the primary object of the invention to obtain a more resilient construction in which the work can be performeed with less fatigue to the operator.

The improvement belongs to buffing of polishing wheels of the type in which a series of disks, as shown in cut, formed of rags or other fabric are glued together, and are peripherally sized and coated with the abrasive material. In the use of such wheels it has been found that when first made they are not adapted for fine work, so that it is customary to first use them upon coarse work until they become more yielding. Furthermore, on account of the rigid character of the wheels, the work performed thereon is more fatiguing to the operator. With the improved construction the initial rigidity of the wheel is overcome, and furthermore, a greater degree of resiliency is imparted thereto than with constructions heretofore used.

1,195,836. August 22, 1916. **Apparatus for Supplying Molten Metal for Molds.** William Montgomery, Jr., and Justus Riehl, of Baltimore, Md., assignors, by direct and mesne assignments, of one-half to said Montgomery, and one-half to John N. McFarland, both of Baltimore, Md.



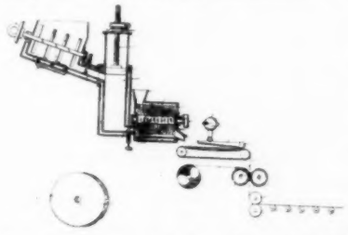
The primary object of this invention, as shown in cut, is to provide a melting pot which is constructed of a shell having inner and outer spaced walls, and to insert or pack between the inner and outer walls of the melting pot an insulating material for preventing the radiation of heat through the sides of the melting pot, for increasing the heating proclivities of the melting pot and decreasing the amount of fuel necessary for the proper melting of the metal used in casting type bars.

Another object of this invention is to provide an adjustable mounting for a burner for heating the interior of the melting pot, by means of which the distance between the upper end of the burner and the bottom of the melting pot may be varied, as desired.

Another object of this invention is to provide a novel form of pump for forcing molten metal from the melting pot into a casting slot for the forming of "slugs" or type bars.

1,196,234. August 29, 1916. **Polishing Wheel.** W. E. Hedler, of New York, N. Y.

This invention relates to polishing wheels, and more particularly to a process of manufacture of such a wheel of resilient material.



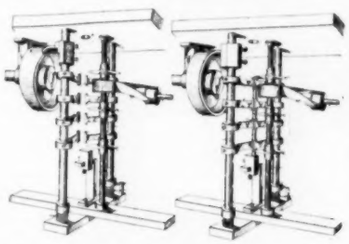
An object of this invention is to provide a polishing wheel, as shown in cut, of a substance, using boiled oxidized linseed oil as a base.

In carrying out this process, the following ingredients and proportions thereof have proven satisfactory for certain results obtained, but it is understood that by varying the proportions and substituting equivalents, polishing wheels of different characteristics may be produced as desired. When the linseed oil has been introduced into the cylinder and the temperature thereof raised to a boiling point, for each 100 parts by weight, four parts of gum, preferably Kaurie, and two parts of resin are added in small quantities from time to time, and this mixture is raised to the temperature of from 394 degrees to 450 degrees Fahrenheit. The admission of air and agitation of this mass reduces it to the elastic fluffy state referred to. When this mass has been admitted into the cylinder, 100 parts of granulated cork are admitted through the hopper where the cork and fluffy mass are thoroughly mixed. As each of the ingredients possesses a sticky binding character, it is clearly seen that when combined as described, they form a homogeneous mass of a resilient and flexible nature, and to which when formed into a completed wheel requires only the addition of the polishing face for the periphery of the wheel.

1,196,360. August 29, 1916. **Metal Tube Extruding Machine.** L. E. Hooker, of Barrington, R. I.

The inventor of this machine says in his application:

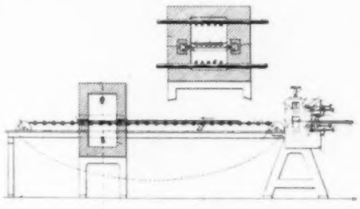
"My invention relates to the manufacture of metal tubes by the extrusion process, and consists in certain improvements I have made to the apparatus disclosed in my patent of April 13, 1909, No. 918,154. In the machine of said patent, the tubes extruded are shown as of relatively short length, say about four inches. In practice, however, I am able, with one operation of the plunger, to extrude tubes of considerably greater length, for example, three feet long or more. The tubes have to be severed into shorter lengths for use and the present improvements, for which I solicit protection, consist of means for automatically severing the tubes into relatively short lengths immediately after they are extruded, whereby a great saving in time and labor results.



"In the accompanying drawings, I have illustrated two forms of automatic tube severing mechanism, one of them being that which I use for tubes of relatively hard metal, such as copper, and the other being that which I use when tubes of soft metal, such as lead, are being made."

1,197,693. September 12, 1916. **Process of Plating Metals.** William E. Watkins, of New York, N. Y., assignor to the Metals Plating Company, a corporation of New Jersey.

This invention relates generally to plating a body of one metal, such for example, as steel, with an even deposit or layer of another metal, such for example as copper.



More specifically the invention comprises a process in which a compound of the plating metal, such as oxid of copper, is so applied to a sheet or other body of metal to be plated, such as steel, as to insure an even layer containing exactly the right quantity of copper for the formation of a uniform, coherent plating of copper on said steel.

Briefly stated the improved process, in its preferred form, consists in grinding a compound of the plating metal, such as oxid of copper, to great fineness in a heavy oil or other suitable liquid vehicle so as to form a suspension or paste; then applying said suspension or paste to the face of the metal to be plated, such as a sheet of steel, in the form of a coating, by means of pressure rolls and finally subjecting such coated sheet to heat sufficient in degree and duration to produce thereon a tough, coherent and uniform plating of copper. Any oxid formed upon the copper plating may easily be removed in a suitable manner, as, for instance, by a proper solvent, such as sulfuric acid. A machine suitable for the process is shown in the cut

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST.

AUTOMATIC WASHING MACHINE

A very interesting machine, which has been recently developed by the U. S. Electro Galvanizing Company of No. 1 Park avenue, Brooklyn, N. Y., is an apparatus for washing different kinds of small material in a number of different solutions, and then drying, all of which is done automatically.

One of these machines was recently constructed for one of the large ammunition companies. It consisted of a receiving bucket, suspended in a tank of water and a number of drums revolving in tanks containing different solutions, and a drying drum. It revolves at a speed of 10 r. p. m., and is installed at an incline instead of perfectly horizontal. As it revolves, the material is naturally advanced forward.

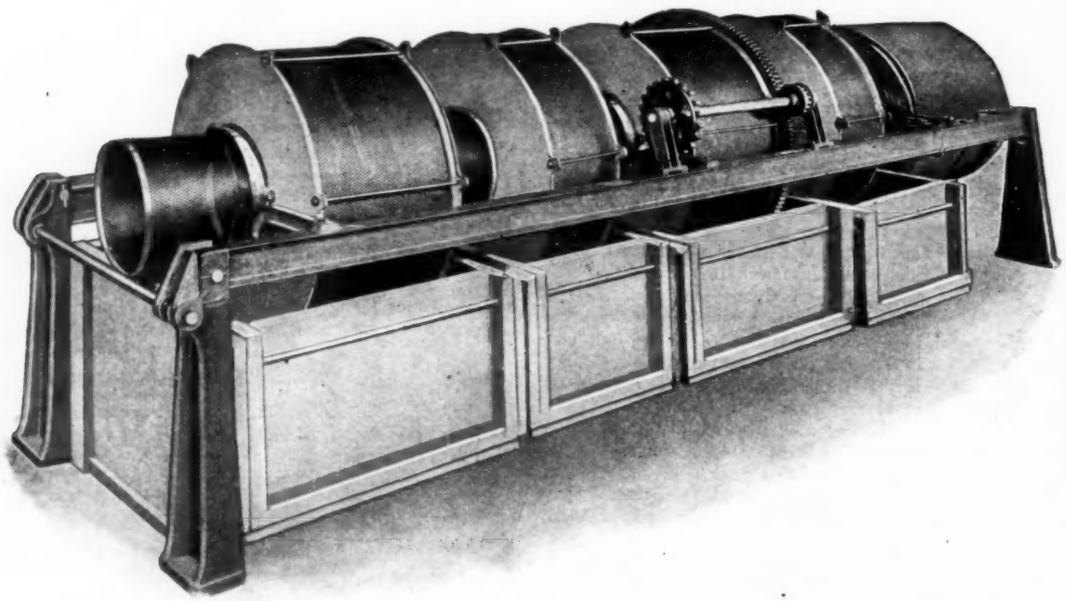
The articles treated are cartridge shells in one of the earlier stages of their stamping process. These shells come from the annealing over, red hot. They are carried down a slide from the oven in trays and at the bottom these trays are tilted so that the shells are emptied into the receiving bucket of the washing machine. This bucket is a square shaped perforated receptacle having a chute at one end.

In its receiving position this bucket is immersed in a tank of water, so that as the red hot shells are emptied from the trays, they strike the water first. This hardens without injuring them. One end of this receiving bucket is then hoisted, the other end containing the chute remaining stationary and working on a horizontal axis. As this bucket is hoisted, the shells run into a vertical perforated cylinder where the shells are drained of the water. From this cylinder they pass into a perforated drum revolving in a tank containing a pickling solution.

They remain in the pickling solution for about four or five minutes. It is not necessary to stop the machine in order to have them remain for this length of time in the pickling solution because it takes that long for them to travel from one end of the cylinder to the end where they are carried out by the pick-up pocket.

As the shells reach the lower or far end of this drum, they fall into a pick-up pocket, which carries a few of them at a time at each revolution of the machine out of the pickling drum and into a perforated cylinder where the articles are drained of the pickling solution. They then advance into a drum revolving in clear water where the pickle is thoroughly rinsed off. It requires only about one minute for them to pass through this drum; they are passed out of this compartment by means of pick-up pockets into another draining cylinder. From there they pass into a perforated drum revolving in a soapy solution, where it requires four or five minutes to pass through.

By means of pick-up pockets they are again passed into another draining cylinder, and then into a drum revolving in clear water. From this they pass into another draining cylinder, and then into the drying drum. This latter compartment consists of an inner cylinder which is supported by legs. This latter cylinder is a sort of hood or container for the heat, and has an opening in its upper part to emit the parting hot air, and three openings in its lower part, into which is introduced the hot air. The whole operation is continuous throughout the machine. As the shells leave each drum, more of them are coming in.



MACHINE FOR WASHING SMALL MATERIAL IN VARIOUS SOLUTIONS.

This apparatus is a very flexible unit, and is subject to a great variety of adjustments and combinations. For instance, the speed of travel of the shells through the machine can be governed by the r. p. m. of the machine, by its slant or incline which can be adjusted, by the width of the pick-up pockets, which are regulated by a device operated on the outside of the drums or by various combinations of the above. The most attractive feature of this machine is that one or two men can operate it, and it does the work of a battery of tumbling barrels requiring 8 to 10 men to operate. The machine is constructed of metals which will not rust nor be affected by acid or alkali solutions.

A NEW RECORDING THERMOMETER

The Brown Instrument Company of Philadelphia is placing on the market a new type of recording thermometer for temperatures to 800° Fahr., or 425° Cent., which embraces a number of original features. This instrument operates on the principle of the expansion of gas with change in temperature. A bulb of

BROWN INSTRUMENT COMPANY INDICATING THERMOMETER.

copper containing nitrogen gas under pressure is connected to a recording instrument by a small copper tube protected by flexible steel tubing.

The recording instrument has a helical spring somewhat simi-

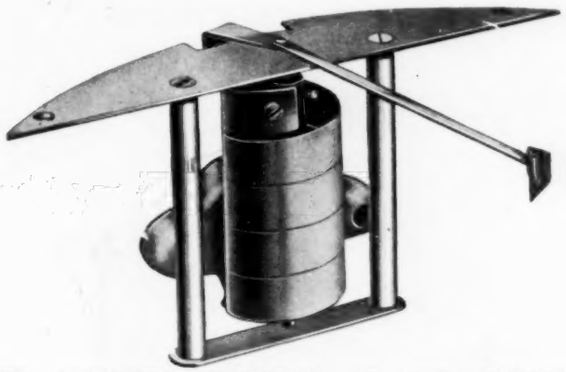
THE RECORDING THERMOMETER DISTANT TYPE

lar to that used in pressure gauges, and the expansion of the gas in the bulb exerts pressure which is conveyed by the capillary tube to the helix, which expands proportionately. This helix is directly connected to a recording arm which marks on the record chart.

This type of instrument can be furnished with tubing as long as 100 feet, if required, so that the recording gauge can be placed as much as 100 feet distant from the point where the temperature is measured. This permits of its application in numerous processes where it is desirable to keep a constant record of the temperature on a chart. Some of the improved features in this new type of instrument follow:

The Seth Thomas clock which revolves the chart is mounted directly on the front plate on which the chart revolves, which insures alignment of the clock and chart plate.

The clips which hold the chart in position are mounted on the door so that when the door is swung aside these clips are automatically swung away from the chart, permitting its easy replacement without interference.



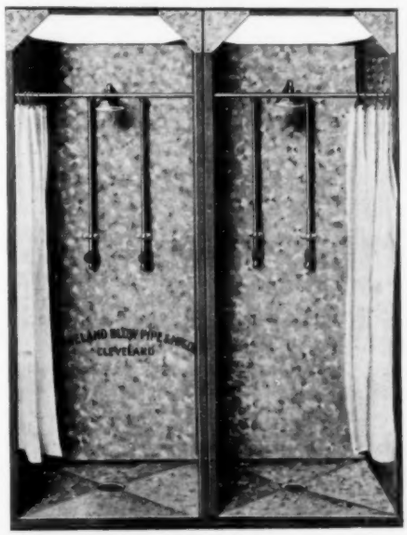
THE ACTUATING MECHANISM OF THE RECORDING THERMOMETER.

A device is furnished which raises the chart pen from off the chart automatically when the door is opened, and frees the pen automatically when the door is closed.

This instrument is made also in indicating form, where desired, to indicate the temperature on a dial instead of recording it on a chart. It is furnished with a number of different types of bulbs, either with threaded connection for insertion in mains and pipes, or with lead coating to withstand chemicals and acids.

SHEET METAL SHOWER BATH

The cut herewith shows the sheet metal shower bath that is now being installed by the Cleveland Blow Pipe and Manufac-



SHEET METAL SHOWER BATH FOR FOUNDRIES, ETC.

turing Company, Cleveland, Ohio. The baths are constructed of heavily galvanized steel. The sheets are reinforced with angle iron and the rod attached to the top is fitted with rings for fastening a covering which makes each compartment private.

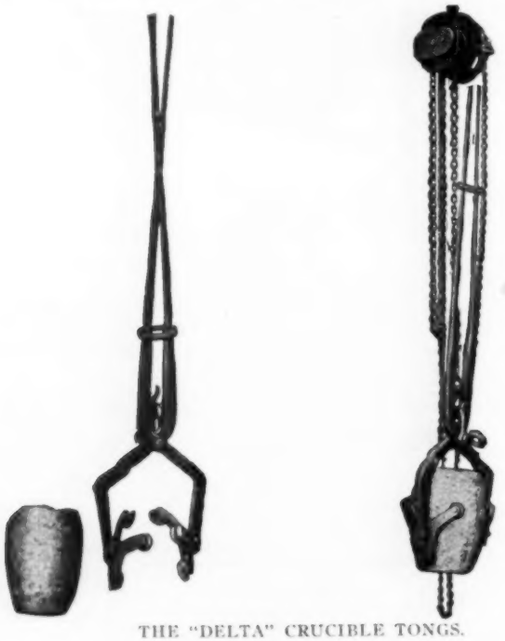
A drip outlet is provided in the bottom for draining. The sheet metal shower bath has been designed to meet the require-

ments of State laws and has been approved by factory inspectors.

The Cleveland company also recently put out a statement to the effect that over 1,500 of their dust collecting hoods have been sold in the United States. Many leading concerns use their hoods, dust collectors and other equipment, some installing them in large numbers. In one instance, 77 hoods were placed in one factory; in another 56 hoods, and a third ordered 47 and so on down to a large number of concerns who have from 20 to 40 in use. Those interested can secure full particulars by asking for pamphlet "SB."

DELTA CRUCIBLE TONGS

The New Jersey Foundry & Machine Company, New York, N. Y., report that they are daily receiving orders for their new crucible tongs which are shown in the illustrations. These tongs, it will be seen, consist of a triangular frame which gives six bearing points on each side of the crucible. The pins with which the tongs are furnished are claimed to withstand rough treatment and do not break, and no matter how rough the surface of the crucible may be Delta tongs insure a well distributed uniform pressure. As the triangular frames are adjustable this does away with the re-shaping of tongs to fit crucibles that have been in service for some time.



THE "DELTA" CRUCIBLE TONGS.

Among users of these types of tongs may be mentioned the following: United States Navy Yard, Norfolk, Va.; Lumen Bearing Company, Buffalo, N. Y.; McNab & Harlin Manufacturing Company, Paterson, N. J.; National Meter Company, Brooklyn, N. Y.; Continental Gin Company, Prattville, Ala.; Bashlin Company, Warren, Pa.; E. W. Bliss Company, Brooklyn, N. Y.; Tuttle & Bailey Manufacturing Company, Brooklyn, N. Y., and the Magnus Metal Company, Depew, N. J.

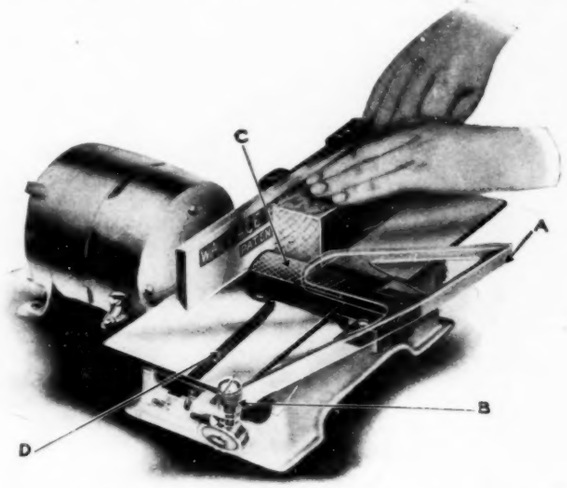
FLAP AND SHUTTER GUARD

The cut shows the flap and shutter guard as applied to the Wallace bench planer.

In the phantom view shown "A" is the flap, an aluminum casting swinging over the tables, and held against the stock by the flap spring "B," so that the unused part of the knife is covered. When special work, such as rabbetting is done, the flap can be swung off the machine out of the way.

The shutter "C" is a part of a steel tube which slides in grooves in the frame concentric with, and surrounding the cutter head, entirely covering the throat opening. The lip of the shutter rests on top of the front table, being held by the shutter spring "D" until it is pushed by the stock around under the rear table.

When the cut is finished the shutter is snapped back over the throat opening. In case of a "kickback" the stock actually draws back the shutter with it, this action automatically eliminating the possibility of nearly every planer accident.



THE WALLACE FLAP AND SHUTTER GUARD FOR BENCH PLANER.

This "foolproof" device is made exclusively for the Wallace bench planer by J. D. Wallace, 518 West Van Buren street, Chicago. Employers of labor and users of wood-working machines who are interested in securing perfect safety without reduction of output, can get full particulars of this device by writing to the above address.

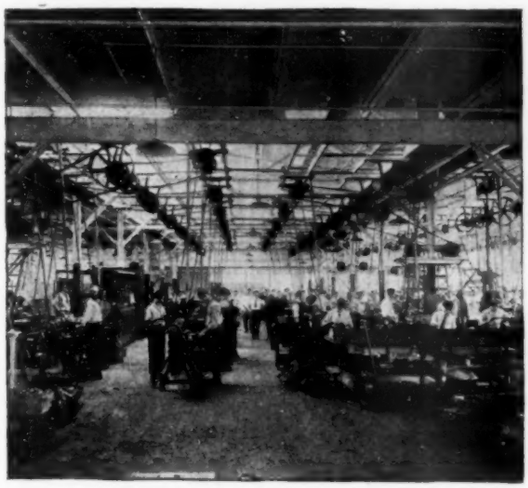
JOHNSON BRONZE COMPANY

The accompanying cuts show the progress that has been made in the machine shop practice for the handling of metals in the new plant of the Johnson Bronze Company at New Castle, Pa. Here is to be found practically every known device for the economical handling of all character of work with the greatest speed and accuracy and at the same time safety. The plant manufactures bronze bushings of all kinds, from the small bushing of the electric fan to the heavy brasses of the rolling mill, and practically all of the work which is first cast in their own foundry is finished in the machining department. The buildings of this plant are of special design, gotten up by the Coleman Foundry Equipment Company, of Cleveland, Ohio, and as will be seen from the photograph the building is of saw-tooth construction, the side being composed of Lupton sash.

THE PLANT OF THE JOHNSON BRONZE COMPANY, NEW CASTLE, PA.

A brief résumé of the manner in which the work in this plant is handled may be of interest. The work enters at the back of the machine department, which is situated next to the foundry, and it is put through its many different operations on its way around the shop to the other end, where it passes through the inspection department and then to the shipping room. There

has been installed a routing and dispatching system to meet the peculiar need of the bronze bushing business, and the system is



INTERIOR VIEW OF THE FACTORY OF JOHNSON BRONZE COMPANY, NEW CASTLE, PA.

so handled that it is possible to know where each piece of work is at any time and just when each order will be shipped.

WOOD TURNING LATHE

The lathe shown in the cut is manufactured by P. Pryibil Machine Company, New York, N. Y., and is listed as a precision tool of the highest quality for wood work. The headstock bearings of this lathe, the manufacturer states, have larger surface

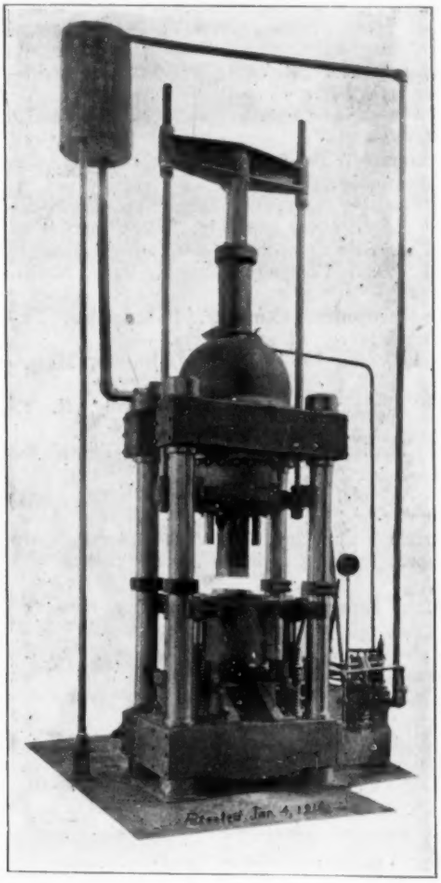
THE PRYIBIL NEW WOOD TURNING LATHE FOR PATTERN MAKERS, ETC.

than any other small lathe, while compressed genuine babbitt metal is used and the spindle cone as well as the countershaft cone are made of metal. The spindle is made of crucible steel forging with a 9/16 inch hole, while lubrication is amply provided for and oil grooves run the entire length of the bearings; thus distributing the oil thoroughly by means of the groove in the spindle. The specifications of this machine are as follows: Swing over bed is 10 inches, length of bed 42 inches, distance between centers 22 inches, floor space over all 3 feet 11 inches by 2 inches, weight 260 pounds, boxed 360 pounds, and cubic feet boxed 20.

The price of the lathe is $52.50 delivered anywhere in the United States. Further information may be had by corresponding with the manufacturers.

1,000-TON HYDRAULIC BRIQUETTING PRESS

The accompanying photograph illustrates a new design of hydraulic press recently brought out by The Hydraulic Press Manufacturing Company, Mount Gilead, Ohio. The press is used for briquetting metal borings, turnings, etc., so that they may be remelted without the loss of valuable ingredients and to prevent oxidation. It also puts the material in a convenient form for handling. This design of press is of the four-rod inverted-cylinder type and is built in three different sizes and pressure capacities, 1,000 tons, 750 tons and 300 tons. The illustration shown is a reproduction of the 1,000-ton press.



1,000-TON HYDRAULIC PRESS FOR BRIQUETTING METAL SCRAP.

The briquet forming mechanism of these presses is unique in design and operation, being capable of forming a briquet quickly and of uniform density. This is accomplished by placing the material in a floating mold which is supported by four springs. When the pressure is applied upon the material from above the friction of the material on the sides of the mold causes it to move down over a stationary plunger which projects into the mold from below. Pressure is thus applied on the bottom, as well as on the top of the material. A briquet of uniform density is obtained in this manner.

After being formed the briquet is ejected from the mold by the pressure of the main ram being applied upon the briquet with the lower plunger removed, the latter being done by a simple movement of a controlling lever. The briquet then falls through to the base of the press from whence it is removed by a conveyer installed by the customer.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS.

CHEMICAL EXPOSITION

The National Exposition of Chemical Industries held at Grand Central Palace, New York, September 25 to 30, in connection with the convention of the American Chemical Society and American Electro-chemical Society, proved to be a decided success. The attendance was more than double that reported for the 1915 exposition.

Among the concerns exhibiting their products were:

Roessler & Hasslacher Chemical Company, New York—Metal cyanides, trisalyt and other chemicals.

Celluloid Zapon Company, New York—Lacquers, etc.

Du Pont Chemical Company, New York—Lacquers, etc.

German-American Stoneware Works, New York—Stoneware acid tanks, utensils, etc.

Tolhurst Machine Company, Troy, N. Y.—Centrifugal dryers for metal goods.

Driver-Harris Wire Company, Harrison, N. J.—Nichrome, the heat resisting alloy.

U. S. Smelting Company, Inc., New York—Producers of "D R W" copper, silver and gold, "Ussco" spelter and lead.

General Bakelite Company, New York—Bakelite, lacquer, etc.

Niagara Alkali Company, Niagara Falls, N. Y.—"Niagalk" potash.

Thwing Instrument Company, Philadelphia, Pa.—High resistance multiple record pyrometers.

Chadwick-Boston Lead Company, Boston, Mass.—Lead-lined tanks.

General Electric Company, Schenectady, N. Y.—Electrical equipment.

General Chemical Company, New York—Phosphorus and other chemicals.

Herman A. Holz, New York—Brinell hardness testing meters; "Rhotanium" alloy.

A. Klipstein & Company, New York—Chemicals, zinc dust, etc.

Butterworth-Judson Corporation, New York—Acids and other chemicals.

Multi-Metal Separating Screen Company, New York—Screening specialties, safety helmets, respirators.

Pittsburgh Testing Laboratory, Pittsburgh, Pa.—Chemists and metallurgists.

Electrolytic Zinc Company, Inc., New York—Producers of spelter.

Metals Disintegrating Company, New York—Lead, tin, zinc and aluminum dust.

Prest-O-Lite Company, Indianapolis, Ind.—Welding apparatus.

Solvay Process Company, Solvay, N. Y.—Alkalis.

Scientific Materials Company, Pittsburgh, Pa.—Laboratory apparatus, etc.

Brown Instrument Company, Philadelphia, Pa.—Pyrometers, etc.

Denver Fire Clay Company, Denver, Col.—Case crucible tilting furnace.

Bristol Company, Waterbury, Conn.—Pyrometers, etc.

Eimer & Amend, New York—Chemical and laboratory apparatus.

Abbè Engineering Company, New York—Beach-Russ blowers and vacuum pumps.

Norton Company, Worcester, Mass.—Abrasives.

Carborundum Company, Niagara Falls, N. Y.—Abrasives.

United Lead Company, New York—Lead-lined pipe and other products.

American Copper Works, Perth Amboy, N. J.—Copper ingots, bars, billets.

Sturtevant Mill Company, Boston, Mass.—Crushers and pulverizers.

Paul O. Abbè, New York—Crushing and pulverizing machines.

Hardinge Conical Mill Company, New York—Crushers and pulverizers for brass foundry wastes, etc.

Schaeffer & Budenberg Manufacturing Company, Brooklyn, N. Y.—Fuel-saving devices.

Leeds & Northrop Company, Philadelphia, Pa.—Pyrometers, etc.

J. T. Baker Chemical Company, Phillipsburg, N. J.—C. P. Chemicals.

L. O. Koven & Bro., New York—Tanks, etc.

Arthur D. Little, Inc., Boston, Mass.—Chemicals.

Taylor Instrument Companies, Rochester, N. Y.—Pyrometers, etc.

Uehling Instrument Company, New York—Pyrometers.

AMERICAN INSTITUTE OF METALS

Secretary Corse has sent out the following letter to the members:

"Doctor George K. Burgess, Chief of the Division of Metallurgy, Bureau of Standards, Washington, D. C., suggests that at the next meeting of the advisory committee held at the bureau this fall, our representatives have available as much information on the properties of various alloys as possible. His idea is to make the bureau a clearing house for this sort of information in order to accumulate reliable experience tables. Will you, therefore, send me such information as you may have showing:

"The chemical composition of the alloy, method of making test coupon, the physical tests determined on the material. Any further information regarding its properties, such as specific gravity, melting point, electrical conductivity, heat conductivity, resistance to corrosion, etc., will be very welcome.

"The Bureau is in receipt of a continual stream of inquiries for information of this character, and on account of its absolutely impartial nature can best serve as a clearing house in the manner mentioned above. The American Institute of Metals has been favorably mentioned in several recent communications from the bureau in connection with its co-operative work there, and we are especially desirous of making this next meeting of the committee a good one by furnishing the data asked for above.

"Will you kindly write me as soon as possible, giving me such information as you may have on the subject."

MASTER PATTERN MAKERS' ASSOCIATION

A meeting was held in Cleveland, Ohio, during the convention of the American Foundrymen's Association by about thirty master pattern makers, with a view of forming a Master Pattern Makers' Technical Association. A list of over 200 names was obtained and an advisory committee was appointed to consider the various matters incidental to forming such an association. The committee was selected as follows: John Pemberton, Lynn, Mass.; A. Crowe, Youngstown, Ohio; J. H. Taylor, Wollaston, Mass.; F. E. Delano, Erie, Pa.; and Jerry Shay, Bridgeport, Conn. A tentative form of constitution was offered and will be critically considered by the advisory committee and also mailed to the entire list of names.

It is expected to hold an annual meeting at the same time and place as the American Foundrymen's Association. The objects of the new organization as outlined by the proposed constitution are: The improvement of the art and practice of pattern-making; to promote social intercourse among the members of the association; to provide for the exchange of technical experience; to encourage uniform standards in shop methods; and, in general, to advance whatever shall tend to the dignity and reputation of pattern-making and the well being of members of the association. Office headquarters have been opened at 206 Bellevue Court building, Philadelphia, Pa.

AMERICAN ELECTRO-PLATERS' SOCIETY

Cleveland Branch—H. J. Ter Doest, Akron, Ohio, president, and Charles Werft, 1775 East 68th street, Cleveland, Ohio, secretary-treasurer.

This branch is now located in its own laboratory at Room 6, 1344 Prospect avenue, Cleveland, Ohio.

Providence Branch—Alfred Senecal, president, and Albert J. Lemrise, 124 Waverly street, Providence, R. I., secretary.

An open meeting of this branch will be held on October 7. The speakers for the evening will be Messrs. Proctor, Hogaboom and Flynn. The Providence Branch has increased very rapidly since it was organized and expects to do better during the fall months.

THE INSTITUTE OF METALS

The Autumn Meeting of the Institute of Metals was held on September 20 at the rooms of the Chemical Society, Burlington House, London, England, at which time the following papers were read and discussed: "The Allotropy of Silver" by Dr. W. D. Helderman, Utrecht University, Holland; "Notes on Cadmium in Spelter" by W. R. Ingalls, New York; "The Annealing of Arsenical Brass" by C. H. Mathewson and E. M. Thalheimer, Yale University, and the "The Development of the Spelter Industry" by Ernest A. Smith, Sheffield, England.

NATIONAL SAFETY COUNCIL

The annual meeting and congress of the National Safety Council will take place in Detroit, Mich., October 17 to 20. We have received a copy of the program—40 pages long—containing the names of 140 speakers. The development of the council's work has indicated the need for intensive study of the problems of various industries, so that the main feature of the meeting this year is sectional conferences. For instance, the electric light and gas industry members will be assembled in the public utilities' section, the foundry members in the foundry section, and the cement members in the cement section.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST.

CALM MORRISON HOKE, A.B., B.S. and A.M.

One of the authors of THE METAL INDUSTRY, whose work has attracted considerable attention and whose photograph is here presented, is Miss C. M. Hoke. We have no doubt that a great number of our readers who have read and commented upon Miss Hoke's articles will be surprised to learn that she is not a "man," but a slender young woman.

The series of articles that have appeared in THE METAL INDUSTRY during the past two years by Miss Hoke comprised "Model Jewelry Factory," which appeared in the September, 1915, issue; "Bringing a Jewelry Factory Up-to-Date," in the January, February and March, 1916, issues; "Fluxes in the Jewelry Factory," April, 1916; "Solution of Platinum in Aqua Regia," July, 1916, and "The Melting of Platinum" in September, 1916. Miss Hoke is a jewelry manufacture expert, and is the first woman to take a number of courses in industrial and electro chemistry.

She is also the first woman candidate for the degree of Ph.D. in industrial chemistry, and in speaking of her recently, one of the staff in the chemistry department of Columbia University considered "Miss Hoke to be the most significant figure working in the precious metals today."

She is the connecting link between the school of pure science and the jeweler's workroom. She has co-ordinated two forces which, unhappily, are too often far apart. On the one hand she is a scientist. This is emphasized by the degrees of A.B., B.S. and A.M., conferred by Hunter College, the University of Chicago and Columbia University, respectively. On the other hand Miss Hoke has had wide experience in jewelry factories and refineries. She knows the real, practical work of the factory from personal labor; she knows the actual manipulation of the precious metals and the scientific theories underlying them. One of the best known of the large Newark manufacturers said of her: "That little girl knows more about refining than any man I know."

CALM MORRISON HOKE, A.B., B.S. and A.M.

As is evidenced in her articles, Miss Hoke possesses the unusual ability to combine the qualities of a scientist, a practical worker and a writer. She can go into a factory or foundry, detect faults in practice, suggest methods of correction, carry out her own suggestions if necessary, and then write a clear and comprehensive treatise on what she has done for the guidance of others.

It is this unique position that gives her articles on metal problems their exceptional value. And it is because her opinion has come to be that of an expert that her advice and services are being sought by an ever increasing clientele in the metal world. Questions relating to the refining of platinum and the other heavy metals, electro-plating alloying and the like, command her attention especially. In addition to her work in scientific directions Miss Hoke finds time to take an active interest in social and political events.

F. Hallett Lovell, Jr., for many years president and principal owner of the Lovell-McConnell Manufacturing Company, Newark, N. J., maker of the Klaxon automobile horn, having sold his interest in the company to the United Motors Company, will remain as a director, but his time will be chiefly devoted to the other manufacturing concerns in which he is interested, among them F. H. Lovell & Company, Arlington, N. J., maker of marine and railroad supplies, of which he is president and principal owner.

T. C. Eichstaedt is now connected as superintendent of the sad iron department of the Rock Island Manufacturing Company, Rock Island, Ill.

W. H. Weber, formerly chemist for the Waterbury Clock Company, Waterbury, Conn., is now connected with the Zenith Carburetor Company, Detroit, Mich., in the same capacity.

J. F. Hubbs is now connected as foreman plater of the Pathe Phonograph Company, Belleville, N. J.

DEATHS

Alexander Talman Whiting, vice-president and secretary of the Whiting Foundry Equipment Company, Harvey, Ill., died September 12, at his home in Chicago, aged 64 years. He was born at Sault Ste. Marie, Mich. After residing in Detroit for many years, he removed to Chicago in 1893, and with his brother, John H. Whiting, established the Whiting Foundry Equipment Company. He was prominent in the Illinois Manufacturers' Association and the Chicago Association of Commerce. He leaves his widow, one son and two daughters.

William Bunting, president of the Bunting Brass & Bronze Company, Toledo, Ohio, died August 26.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS.

NEW BRITAIN, CONN.

October 2, 1916.

As has been the case all summer, general business conditions here are good and the outlook for a busy fall is bright. Every concern is working on a full schedule and orders are plentiful. Labor conditions to date are also good. Where a year ago this time the city was torn with industrial strikes and riots, today all is peaceful and there are no indications of any further trouble. In fact, the chief difficulty seems to be in securing enough help, as the "war baby" concerns in Hartford, Waterbury and Bridgeport, to say nothing of the Winchester Fire Arms Company of New Haven, Conn., are luring away scores of skilled workmen by their high rate of pay.

The North and Judd Manufacturing Company is doing an excellent business, better than ever before, and with several new novelties in the line of buckles and harness trappings recently put on the market, there is evidence of even more business.

The Bristol Brass Company is also flourishing and cannot handle all of its orders for rolled brass. The P. and F. Corbin branch is likewise busy and still continues to do some work in the war order line. A report was current some weeks ago that they had ceased this work, but it was unfounded and the war order jobs continue.

The New Britain Machine Company is doing such a flourishing business that during the last week of August the directors took the entire factory force on an outing, costing about $4,000. It is rumored that this plant will cut a melon in the shape of a stock dividend before long.

Work at the Stanley Works is rushing and at the Union Manufacturing Company a night shift is still working part of the time. The Skinner Chuck Company, employed in making jigs and chucks for other machine companies, has all the business it can handle, and the Landers, Frary and Clark Company, manufacturers of table cutlery and all sorts of culinary utensils, is doing a big business in anticipation of the Christmas trade.—H. R. J.

PROVIDENCE, R. I.

October 2, 1916.

There has been no change in the industrial situation among the metal working trades of Rhode Island during the month of September except, perhaps, to intensify the stringency in the matter of desirable help. The majority of the plants of manufacturers of machinery and tools and in the foundries as well as among those engaged in the various branches of metal working are still engaged on war orders, either directly or indirectly, and have contracts for months ahead. The shortage of skilled labor is causing the manufacturers considerable worriment whether they will be able to keep up with their contracts.

The manufacturing jewelers, and kindred and allied trades, are happier than they have been for the past two or three years because of the amount of business that they are securing at the present time with most promising outlook. Many of the factories are working on an overtime schedule and advertisements for help are numerous and constant. The demand is for bench and press hands, engravers, chain makers, box makers and stone setters.

One of the strongest indications of generally prosperous conditions among the metal trades is found in the unusually large number of permits for new buildings, or additions, that have been granted during the period since July 1, nearly thirty permits having been issued for the erection of additions to manufacturing and business plants in this city. This number is believed to be the largest in a similar period that the city has ever issued, and is the most significant in view of the unusually high cost of building material and the scarcity of labor.

Among the concerns that have been granted permits are the following: James C. Doran Company, manufacturing jewelers, one-story brick workshop and one-story brick storehouse; Gorham Manufacturing Company, silversmiths, one-story brick manufacturing building and one-story brick addition to foundry; American Emery Wheel Works, three-story addition to manufacturing building and three-story brick workshop; Providence Manufacturing and Tool Company, two story wooden addition to manufacturing building; Atlas Sheet Metal Works, one-story wood storehouse; Brown & Sharpe Manufacturing Company, one-story brick factory building.

The American Ring Company of this city, a corporation capitalized at $25,000 for the manufacture of jewelry, has changed its name to M. Winugro Son Company, Inc., with a capital of $10,000. The new concern will engage in the manufacture of paper and woolens and will deal in metal and rubber.

The Uniform Seamless Wire Company of this city has been declared solvent by the court and the petition in bankruptcy filed against it a month ago has been dismissed by Judge Arthur L. Brown, of the United States District Court. This decree confirms the finding of the court a month ago, when the case was first heard. It also agrees with the findings of the court a few days previously, when the claim of John T. Boland for $24,855, alleged to be due him for back salary as manager of the concern, was denied by Judge Brown.

The product of the Standard Nut and Bolt Company, of Valley Falls, R. I., continues in demand to the same extent which has marked the business of the plant for the past year or more.

The recent addition to the building used by the concern has relieved the congestion formerly in evidence at the plant.

The Providence Co-operative Sheet Metal Company have moved their office and factory to 209 Cranston street. The increase in volume of business and the installation of additional machinery necessitated an increase of over 4,500 square feet of floor space.

The Fairmount Foundry Company, a corporation authorized to engage in the business of manufacturing metallic castings and machine tools, has been incorporated under the laws of Rhode Island. The incorporators are Matthew M. Sweeney, George E. Bouvier, Clifford Teachman and Charles W. Neyman, all of Woonsocket. The new concern will be located on Second avenue, near Fairmount street, Woonsocket, and is capitalized at $35,000. —W. H. M.

BUFFALO, N. Y.

October 2, 1916.

These are busy days for Buffalo industrial plants, the various houses here reporting almost unanimously that they are rushed. There is no perceptible labor trouble, but an opportunity is here for molders.

A large stock of castings in a shop of the Buffalo Copper & Brass Rolling Mill was ruined on the night of September 7 by water pumped into the building by the city firemen, summoned when the wooden roof of the shop caught fire. Machinery and furnaces also suffered, and Floyd M. Wills, secretary of the concern, estimated the damage at $150,000. This was a new shop, approximately 300 feet wide and 1,000 feet long, the walls being of steel and the roof of wood. About 500 men were employed in the shop and 4,000 in the entire plant, which is operated night and day. The wrecked part of the castings shop has been rebuilt and will be finished in the first week of October. Mr. Wills reports business as "mighty good," but Buffalo contributes only slightly to this concern's prosperity. Munitions are the great factor.

The Lumen Bearing Company reports business good, with the outlook bright for the next two or three months. This company, which has heretofore used both direct-flame and crucible furnaces, has replaced all the crucible furnaces with the direct flame. The company has had plans drawn and is soon to put up a new building which will add practically 33 1-3 per cent to its molding floor. Another improvement by the Lumen company is a new garage on the grounds, to accommodate the personal cars of the owners and the trucks required in the business. This firm could use ten good molders at once; it has felt sharply the inability to secure enough capable men for its increase in orders.

The Schnell Bronze Bearing Company reports a difficulty in keeping prices of products above the advancing price of material. A 10 or 15 per cent increase above normal would be tolerated by the customers, but material is now 50 per cent. above normal and customers object to having the prices on finished work increased in proportion. However, the Schnell company is still doing a good business in castings and bushings.

The Zero Valve & Brass Manufacturing Company reports business "very, very good." There is no difficulty at present in securing the right kind of molders and mechanics, though these men were scarce last spring. This company also comments on the high prices of material, which have been going up gradually but constantly for the last three years.

The A. G. Fries Plating Company is, to use the very words of A. G. Fries, proprietor, "rushed to death." The plant, however, looks very much alive, with a full force of men engaged in galvanizing and oxidizing.

The Unique Brass Foundry Company, which moved into its new building last May, has all the business it can handle until next July. It is putting more men on all the time, principally the men who were laid off with the completion of contracts last winter. The principal business of this concern is the manufacture of brass automobile parts.

The Washington Plating Works, doing nickel, gold, silver, brass and copper plating, reports job business picking up—"pretty fair in the metal plating line."—R. E. D.

DETROIT, MICH.

October 2, 1916.

Announcement made within the last two weeks that the Pennsylvania Railroad had decided to spend $10,000,000 in entering Detroit has brought gladness to the hearts of all brass and aluminum manufacturers, together with many automobile concerns here. For years these shippers have experienced exasperating delays due to the lack of transportation facilities. The railroads now are taxed to their utmost to handle the merchandise that is shipped out and into the city.

The Pennsylvania's announcement that it will grab off a good slice of the lucrative business here means that this shipping trouble will be done away with in part at least. The company will construct a line in from Toledo, fifty miles away, in order to reach Detroit. The tracks will come in from the west side of the city, tapping the new Ford tractor plant at Dearborn and also extend to the Ford plant in Highland Park. All along this new line are located brass and aluminum plants, and it is believed that many other factory owners will establish themselves along this new terminal.

It may not generally be known that the 1916 automobile season closed August first. It has been learned that the Buick Company at Flint, Mich., manufactured 80,000 cars and plans to make 122,000 in 1917. The Maxwell Motor Car Company, with plant and main offices here, plans to produce 120,000 cars during the 1917 season. The output for 1916 was 60,498 cars. The Saxon Company has planned to manufacture 45,000 cars in 1917. The production for 1916 was 25,399. The Ford company has not yet announced its plans for 1917, but with the new designed car it is placing on the market, it is estimated the company will manufacture about 750,000 during the season. The Ford company is now employing 35,000 men and is expending about $10,000,000 in additions to plant and equipment, with the expectation of increasing its force of employees to about 50,000 persons. These figures apply to the Detroit plant and does not include the many branches and assembling plants throughout the country. The Ford company manufactured 523,920 cars in 1916.—F. J. H.

The National Brass Company, manufacturer of brass hardware, Grand Rapids, Mich., is erecting a two-story addition, 45 x 185 feet, to be used as a boiler and engine room and as a plating, tumbling and lacquering room. The company is also contemplating the erection of an iron and brass foundry in the future. The company now operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, and stamping, plating, polishing, japanning and lacquering departments.

The business situation in the non-ferrous metal lines for Detroit and vicinity continues satisfactory, and what is perhaps of greater importance, the outlook is highly favorable and even larger business this fall is in sight than was ever known, although the shortage of labor and further increase in cost of raw material are causing considerable anxiety amongst consumers and manufacturers.

Business continues to expand, which is proved by the marked increase in railroad earnings, trade returns and bank clearances. That considerable development in variety and scope of Detroit-made metal goods is shown by the fact of the new additions added to the old to take care of the increased business and new lines.

Munition production has increased along the Canadian border in the brass manufacturing plants, instead of diminishing, and there is evidence in the volume of output becoming more insistent. Contracts have been let for the erection of the International Nickel Company's plant, to be located at Port Colborne, Ontario, on the east side of the lake front. The plant will cover 35 acres and will cost over three million dollars.

The manufacturers of steam brass goods are all running to the full limit, with plenty of orders on hand.

Gaillee Brothers, manufacturers of fittings, rails and brass parts for motor boats, is doing the best business in the history of the concern, and Mr. Liberty reports the outlook as very promising. —P. W. B.

COLUMBUS, OHIO

October 2, 1916.

The metal market in Columbus and central Ohio territory has been ruling quite firm during the past month. Buying is being done on a rather liberal scale and prices are generally well maintained. Orders are about equally divided between those calling for immediate shipment and for shipment during the month of October. The tone of the market is generally good and prospects for the future are considered bright in every way. The volume of business is steadily increasing on all sides as new metal-using concerns are started. There is a fair supply of all metals available and no scarcity in any line is reported.

The demand for type metals and babbitt is one of the best features of the trade. Copper is firmer all along the line, and there is a good volume of business. Copper is quoted at 25¾ to 26 cents for crucible shape. Tin is selling around 41 cents. Zinc is firm at 10½ cents, while lead is quoted at 7.1 cents. Brass is one of the strongest points in the trade, selling from 21½ for heavy red to 16½ and 17 cents for yellow grades. Other metals are generally firm and unchanged in price.

The Columbus Brass Company, 544 Dublin avenue, has recently received orders for its materials from some very widely scattered points, both in and outside of the United States. Their products are being used in the construction of a post office at Hilo, Hawaii; the Capitol Theatre at Macon, Ga.; the Red Cross building and Department of Interior building at Washington, D. C.; a post office at Wellsburg, W. Va.; the Union Arcade building, and City and County building at Pittsburg, Pa.; the Southland Hotel, Norfolk, Va.; Barbour School, Rockford, Ill.; a post office at Elyria, Ohio, and the Bartholomew County Hospital at Columbus, Ind.—J. W. L.

CLEVELAND, OHIO

October 2, 1916.

That Cleveland is third foundry center of North America is now a well-known fact among the representatives of the industry who attended the American Foundrymen's Association Convention here last month. That this, the sixth city, is climbing steadily toward that position in other branches of the metal industry, is perhaps not quite so well known, but it is a fact, nevertheless.

Phenomenal growth in all branches of the metal industry during the past two years is responsible. And this growth is substantial. Practically all plants in the Cleveland district are now working on orders for merchandise for domestic consumption, instead of concentrating on war orders, the original impetus to the present prosperity.

Probably the most significant development during the month is that Cleveland, sixth city, bids fair to become the first in automobile manufacture. This possibility is admitted by a Detroit newspaper, in a city where automobiles have been the first product for years and Readers of this column will recall the different firms which have transferred their locations from Detroit to Cleveland in the last few months. Some half dozen firms are either here now or ready to start operations within a few months.

Still greater possibilities for the metal industry have developed during the last few weeks. The Cleveland Co-operative Stove Company has acquired nine acres of land in the southern part of the city, upon which a $200,000 plant will be erected. The new structures are needed to take care of extraordinary increase in business.

The White Company, producer of the White automobile, is planning a similar expenditure for new plant and equipment to its present establishment at Gordon Park.

Other recent developments in expansion lines are seen in plans for enlargement of factories of the Cleveland Wrought Washer Company, the Peters Machine & Manufacturing Company and the Ohio Blower Company.

Another plant induced to come here is the Ackerman Wheel Company, of Dover, Del. David Walker, member of the company, has negotiated for a site, upon which will be erected a plant where automobile, truck, motorcycle and aeroplane wheels will be made.

Following the incorporation of the Farnan's Brass Works Company on September 14, Miss Catherine Farnan was named president of the organization and assumed active control of the plant. Miss Farnan has been in the brass foundry business for twenty-five years, succeeding both her father, James Farnan, and her brother, Joseph, at their deaths. She is said to be the only woman actively engaged in the foundry business in Ohio. Other directors named with the incorporation of the firm are Clay J. Smith, Joseph A. Kiewel, L. P. Smith, Jr., Simon Resek.—C. C C.

CINCINNATI, OHIO

October 2, 1916.

Business in the metal trades has hardly paused in activity during the past month, although the heat, the vacation period and the normal dulness of the latter part of the summer were in evidence to diminish the amount of work handled. The return of activity which is usually seen in the fall is now in evidence, however, and prospects are that the fall and winter will witness an amount of work in local shops and foundries never before seen, even in the unprecedented activity of the past year. The reason for this lies in the fact that not only is the activity in the machinery trade called forth by the war still going on, but that domestic business of all sorts has been on the increase lately, with every indication of keeping up its move in that direction for an indefinite period. The high prices to be received for crops of all sorts, including, of course, wheat, corn and cotton, and the general prosperity seen in various lines of manufacturing and other business, have resulted in a direct stimulus to the metal trades as well as to other lines; and big business at profitable prices is the logical consequence. The marked and continuous improvement in business conditions in the South, always an important part of Cincinnati's trade territory, is having its effect, and the demand for all kinds of metal goods is as noted as that for other merchandise.

The coppersmiths are doing well, in spite of the note of pessimism among the distillers of bourbon. Work for other lines is sufficiently active to keep the shops going, and if the alcohol market, which has of late seen something of a slump, should approach its activity of a few months ago, the coppersmiths would again have more orders for new equipment and repairs than they could readily take care of, especially in view of the high price of copper and the difficulty of securing quick deliveries of the metal.

The building trades, with their call on plumbing fixture manufacturers and makers of building hardware, are a good deal more active now than they were during the summer, when the shortage of labor and other conditions slowed things down materially. On the whole, there is little reason to doubt that the coming months will again see the metal trades on a high plane of prosperity.

The James Murdock, Jr., Company, at 116 Opera place, Cincinnati, manufacturers of stencils and similar work, has been placed in the hands of Paul V. Connolly as receiver. The receivership was the result of a suit filed by Winslow J. Murdock, president of the company, who sued as a creditor to the amount of $12,916, represented by the company's notes, and $1,015 due him for salary. Other creditors were said to be threatening proceedings, and it was thought best to have a receiver appointed.

The consolidation recently at Dayton, Ohio, of several concerns prominent in the metal trade resulted in the organization of the Pasteur-Chamberland Filter Company, The Pasteur-Chamberland Filter Company, an older corporation, the Pasteur Filter Sales & Repairing Company, the Automatic Lamp Control Company and the Dayton Spinning & Novelty Company were the companies taken over, the merger being handled by I. C. de Beucklaera, former general manager of the Pasteur Filter Sales & Repairing Company. William Grether, of the Grether Fire Equipment Company, will be president. The company will continue to manufacture a line of water filters and will also do a general jobbing business in metal spinning, plating, brass machining, and the like.—K. C. C.

LOUISVILLE, KY.

October, 2, 1916.

Business is sort of betwixt seasons with the coppersmiths of Louisville just now, but is expected to open up well during October and November. The Kentucky distillers are a little slow in

placing repair contracts, due to the high price of coal and grain, and some of the smaller companies may not operate this winter if the markets fail to go down. However, there is a good deal of work in sight, and the trade is generally optimistic. Prices on raw material continue high, but deliveries are now better than at any previous time in many months, and less trouble is being experienced in getting labor.

Metal prices quoted delivered in Louisville are about as follows: Sheets, base, 37½ cents; tubes, base, 42 to 43 cents; ingot, small lots, 30 to 32 cents; carlots, $28.50; scrap copper, 23 cents; light scrap copper, 21 cents; scrap brass, 18 cents; scrap lead, 6 and 7 cents; ingot, 8 cents; ingot zinc, 14 cents. Some sheet copper can now be had in ten days or two weeks and tubes in six weeks.

C. J. Thoben, of the Vendome Copper & Brass Works, reports that the company has enough business on hand to keep everyone out of mischief, and is looking forward to a busy fall. E. E. Sherman, recently returned from Louisiana, where he had been overseeing some distillery contract work.

Louis Rindt, formerly head of Rindt Bros., which succeeded the Art Brass & Plating Works, and which was in turn succeeded by the Stege-Rindt Plating Company, now the Stege Brass & Plating Company, has definitely announced that he will re-enter the metal industry, and is now looking over several locations. He expects to lease a plant and start operations shortly. Mr. Rindt's address is 1902 Stevens avenue.—O. V. N. S.

TRENTON, N. J.

October 2, 1916.

One of the busiest Trenton plants at the present time where metal is used in abundance is the Ingersoll-Trenton Watch Company. The continued demand for the Ingersoll Watch has made it necessary to increase the production from the local plant, and as a result General Manager George F. Eberhardt has during the past few weeks added to his force thirty expert watchmakers besides a number of help in various other departments. Mr. Eberhardt says that he still has room for at least a dozen more watchmakers. Help is also wanted in the tempering department. The Ingersoll-Trenton Company has close to 500 hands, and the weekly pay roll amounts to more than $6,000. The plant has a capacity of 1,000 watches a day, which will shortly be increased to 1,200.

A cut in the wages of the piece workers at the Standard Fuse Corporation plant at Bordentown, N. J., resulted in a strike and came near causing a shutdown of the big plant. There are about 1,000 hands, including many women and girls, employed at the plant. The employes are organized into a Fuse Makers' Union. Some time ago the company announced that employes would suffer a reduction of 57 cents for each machine spoiled in turning out the brass munitions. This caused a strike and the company finally allowed the old rule to stand of not docking the men for any spoiled goods. The men were paid 2 cents a fuse and a bonus on all 200 shells turned out in one day. Recently a notice was posted that in the future but 1½ cents would be paid for each fuse. Here the employes balked, claiming that the company is more strict, and that it was impossible for them to turn out more than 200 shells a day. The notice also stated that the former order of docking men for spoiled goods would again go into effect. Fifty men in three different departments of the night shift then went on strike. The strike lasted but a short time, the company agreeing to grant the demands of the men. The strikers are organized, and the company feared a general walkout. The majority of the brass workers at the Standard plant are residents of Trenton and commute daily.

Trenton plants of the metal industry continue busy and the proprietors anticipate a good season: The Skillman Hardware Manufacturing Company is very busy at this time and is working on several large orders. The Billingham Brass and Machine Company recently placed more hands at work. Since the company became very busy it has kept the majority of the Trenton junk dealers busy furnishing scrap brass. Scrap brass took a little jump in the market here recently, but the drop was not big enough to cause any scare.

The National Brass Founders' Association, in convention at Atlantic City, declared that the munitions boom has more than doubled the cost of copper and a more serious handicap has resulted from the manufacturers paying extravagant prices to workmen.

The Riverside Watch Case Company is manufacturing in its new addition ammunition supplies for the fighting nations. The order calls for brass cups for the tips of explosive shells.

The Electrolytic Zinc Company, of New York, has leased a factory building at Bound Brook and will install new machinery and begin operations soon.

The J. L. Mott Company finds business good aside from the new order for fuses for the European nations. The company is working on an order for South America. Only about half the force employed on the first munitions contract was taken back to work on the second order. The Mott Company has more time to turn out the second order and is not working overtime on the job or hurrying it with a big force. Besides the shells are not as hard to manufacture as was the first lot for the Bethlehem Steel Company.

The Trenton Malleable Iron Company is busy on an order for brass castings, while the Trenton Brass and Machine Company is turning out some special articles in brass. Other Trenton plants where metal is manufactured and used and where business is reported as being good are the Trenton Smelting and Refining Company, McFarland Foundry and Machine Company, National Electric Plating Works, John A. Roebling's Sons Company, Bechtel Engraving Company, Mercer Automobile Company, Clifford Novelty Works and the Morris Movshovitz & Son Smelting Company.

The general demand for watches throughout the country and in foreign countries has caused a rush of business at the metal plant of Morris Movshovitz & Son, located along the Delaware river in South Trenton. The company distills high grade spelter known as the "Puritan Brand" 99.90 zinc. Nothing but high grade zinc is distilled, and there is a big demand for this at the present time throughout the country. Nearly the entire product of the Movshovitz plant is used by watch companies. An official of the plant informed a representative of THE METAL INDUSTRY that business was very good and that there were enough orders on hand to keep the plant running full handed for some time.

The E. I. du Pont de Nemours & Company is equipping a building at Rockaway River Valley with machinery to manufacture bronze. The building was formerly used as the Norton Iron Works. Gustav Seynord, of Boonton, is acting superintendent of the factory, and George F. Daniels, of the Du Pont engineering department, is in charge of the work of construction. C. A. L.

NEWARK, N. J.

October 2, 1916.

Nothwithstanding the fact that a presidential campaign is on and fall business has not fully opened up yet, business is generally good and is daily increasing in volume, though certain industries are a little slow. The munition factories continue to be very busy, but are not working under the high tension that they were a few weeks ago. The past summer has been one of the best the Newark manufacturing jewelers have had for several years, and the manufacturers are looking forward to a fine fall. For two or three weeks in September there was a little lull. Some of the manufacturing silversmiths are very busy; others but moderately so. Platers are doing a fair business, but complain that their profits have been eaten into very materially by the high cost of most all materials.

The material proposition is one that continues to perplex all manufacturers. What they can get costs so much more than it did that notwithstanding the fact that many have raised the price of their finished product their profits are not as large as they were. Shipments of materials are often delayed for months. Some materials cannot be secured at all now, or in such small amounts as to be practically of no value. Because of this condition some manufacturers have discontinued making certain lines temporarily. Others are adopting styles to materials available. Many manufacturers have thus worked off a lot of material that has been hanging around for years and which under normal conditions it would have been hard to dispose of. What could not be worked up into goods has been profitably sold as scrap. In many instances during the past year scrap metal has brought as much per pound, or nearly as much, as the new metal costs under

normal conditions. This is not the general rule, but is not infrequent. In all cases scrap has brought unusually high prices, however.

The Newark branch of the National Metal Trades' Association, which was organized last spring when the machinists struck for an eight-hour day, has decided to reorganize and enlarge its scope so as to reach all employers of labor. Another name will be selected in keeping with its increased scope. The purpose of this organization of employers will be to better industrial conditions, solve problems which frequently confront employers by working for staple conditions of the labor market locally, and to make Newark attractive to large manufacturers.—R. B. M.

NEW YORK, N. Y.

OCTOBER 2, 1916.

The metal trades in this market are quite active, and this condition, it is believed by a good many of the local men, will continue for some time. While not all are very anxious about predicting future conditions, yet a fair share of them believe that the fall trade will be very encouraging. Throughout the city it is reported that a large percentage of the dealers' collections are slow in coming in. This, the dealers say, is a great source of inconvenience because when they buy metals they are compelled to pay cash, and if they do not the metal dealer is very apt to turn them down. Then on the top of this they must pay their employees high wages, which come due every Saturday. Thus the coffers are usually thinned out because of the slowness of collections.

The general condition among the brass finishers and brass goods dealers is that business is very good. Those engaged in the making of fancy wares are particularly so, and are getting ready for the Christmas trade which is about to break.

The Hudson Brass Works of Grand street, Manhattan, has moved to 16 Nassau street, Brooklyn, where it is occupying a much larger and up-to-date quarters.

The New York Brass and Wire Works Company are doing considerable special work.

Local platers and silversmiths are very busy at present, and judging from present indications they expect to continue to be so for a considerable time. A number of the dealers are having a difficult time in trying to get a sufficient amount of labor, and as a considerable amount of the work demands immediate attention this has seriously handicapped a number of the local concerns. The men, it appears, are itching for more pay, yet they receive more wages than they receive in a majority of the other cities.

The foundry trade has picked up since the first of the month, and from present appearances the Fall trade will be unusually good. Yet in spite of this optimism a number of the foundrymen complain that a number of their customers are having their castings made out of iron or steel, wherever it is possible, because of the enormous advance in metal prices, and because of prices the local foundrymen are very reluctant about taking blanket or contract work. They prefer to do business, at least at present, on the jobbing price scale in order that they may be in a position to adjust their prices to the prevailing metal prices.

One of the busiest foundries in the city is the New York Brass Foundry, and they report that they have not been as busy as they are at present for the last two years, and that they expect this activity to continue for some time to come.—G. W. G.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

Frank Duffy has taken a position as foreman plater with the Beacon Electric Company, 132 King street, Brooklyn, N. Y.

Southwark Bronze Company, founders and finishers, Philadelphia, Pa., has taken over the Homer Brass Works, Inc., of the same city.

The J. B. Ford Company, manufacturer of the Wyandotte metal cleaner and also of chemicals, Wyandotte, Mich., has opened a branch office at 402 Maryland Trust Building, Baltimore, Md.

The Toothill Rolling Mills, Inc., of Brooklyn, N. Y., has been chartered with $10,000 capital, to deal in white metals and carry on a rolling mill. Louis Smith, Jr., Benjamin L. Bennett and David Brody are directors.

The nickel anode foundry of the Apothecaries Hall Company, Waterbury, Conn., was recently completely destroyed by fire. A new foundry is now being erected and all orders have been postponed until it is completed.

The United Smelting & Aluminum Company, Inc., New Haven, Conn., announces that its new rolling mills are now opened and that it is equipped to take care of orders for aluminum sheets, coils, circles in any specifications.

The Electrical Alloy Company, Morristown, N. J., manufacturers of high-grade resistance materials, are breaking ground for a modern factory which, when completed, will include the latest machinery in the wire-drawing industry.

The foundry and machine shops of P. Pettler & Son, Beaver Falls, Pa., recently destroyed by fire with a loss of $40,000, are being rebuilt, and the company is filling orders with machinery and mill supplies which were not damaged by the fire.

The Central Metal and Supply Company, manufacturers of plumbers' supplies and brass and copper in sheets, rods, tubes, wire, etc., Baltimore, Md., have leased a building at the corner of North and Maryland avenues to be used as a showroom for plumbing fixtures.

The Chicago Hardware Foundry Company, Chicago, Ill., has completed the addition to its plant and the company operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, galvanizing, brazing, plating, polishing, japanning and lacquering departments.

The Niagara Alkali Company, Niagara Falls, N. Y., has erected another addition to its plant, making the fourth in all. The company has spent a total of $750,000 in improvements and at present is producing caustic soda, but as soon as the European war is over it will be in a position to turn over the plant for the manufacture of caustic potast, the base for which is nitrate of potash and which is only mined at present in Germany.

Herbert J. Hawkins, for several years representative of the Hanson & Van Winkle Company, Newark, N. J., in Detroit, Mich., and surrounding territory, has opened an office at 610 Sun Building, Detroit, Mich., and will engage in the selling of platers' and polishers' supplies and equipment. Mr. Hawkins has been in the line for many years and is well known to the trade through his book, "The Polishing and Plating of Metals." Mr. Hawkins will again handle the products of the Hanson & Van Winkle Company.

The United Motors Company has acquired the Lovell-McConnell Manufacturing Company, 190 Wright street, Newark, N. J., manufacturer of automobile and marine electrical appliances, warning signals, etc., and the name of the company has been changed to the Klaxon Company. D. A. McConnell, formerly vice-president becomes president and general manager, and W. P. Coghlan, formerly secretary, becomes secretary and treasurer. F. Hallett Lovell, Jr., former president, retires from the company. The Klaxon Company operates a brass machine shop, tool room, plating, polishing, japanning, lacquering and soldering departments.

The Imperial Brass Manufacturing Company, 1200 West Harrison street, Chicago, Ill., manufacturer of brass specialties, is constructing an addition to its plant which will double its floor space, giving it a total of 150,000 square feet, and will more than double its present foundry space. The plant has been operating day and night for many months on

domestic orders. New equipment has been provided for. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop, spinning, stamping, galvanizing, tinning, brazing, soldering, plating, polishing, lacquering and japanning departments.

INCREASE OF CAPITAL STOCK

The Dominion Copper Products Company, Lachine, Quebec, Canada, has increased its capital stock from $500,000 to $1,000,000.

REMOVAL

The New York office of the Munning-Loeb Company, Matawan, N. J., manufacturers of electro-plating and buffing apparatus and supplies, formerly located at 417 Canal street, has been removed to the Taylor Building, 39 Cortlandt street. The New York office is in charge of G. C. Backus.

FOREIGN TRADE OPPORTUNITIES

For addresses of these inquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

Tin bars, No. 22327.—An American consular officer in Chile writes that a firm in his district wishes to sell tin bars. The firm states that it can supply about 12 tons per month. Full information as to marketing conditions is desired. Correspondence in Spanish.

Brass tubes, No. 22485.—An American consular officer in Argentina writes that a manufacturer's agent in his district has a client who is in the market each month for large quantities of brass tubes of varying sizes and thicknesses. Further information as to sizes, etc., may be had on application to the bureau or its district offices, where samples of the tubes may also be examined. (Refer to file No. 79517.) Correspondence in English. Reference.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To deal in sheet metals.—Gurtman Sheet Metal Works, Passaic, N. J. Capital, $10,000. Incorporators: Harry Gurtman, New York, N. Y., and Max Gurtman, Passaic, N. J.

To deal in copper, etc.—Clifton Sheet Metal Works, Clifton, N. J. Capital, $50,000. Incorporators: John Gotfried Larson, Ellen H. Larson, Cornelius Van Hassel, Clifton, and Otto Klewin, Paterson, N. J.

To do a metal plating business.—The Metals Plating Company, Cleveland, Ohio. Capital, $5,000. Incorporators: Edmund W. Hyde, Joseph Bedo, Julia Bedo, Ada C. Hyde and Ralph W. Edwards.

To work in brass.—The Vulcan Brass Manufacturing Company, Cleveland, Ohio. Capital, $25,000. Incorporators: H. J. Gruirnk, E. M. Denner, I. Amster, L. C. Sommasson and D. E. Morgan.

To manufacture brass and copper.—The Cleveland Copper and Brass Rolling Mills Company, Cleveland, Ohio. Capital, $10,000. Incorporators: H. J. Klosser, G. L. Branch, A. C. Altman, J. C. Quayle, and B. M. Duncan.

To manufacture metal products.—The Universal Manufacturing Company, Cleveland, Ohio. Capital, $20,000. Incorporators: Charles Miles, John E. Miller, William H. Miller, William H. Orgel and James L. Miller.

To manufacture metal fasteners.—Presturn Manufacturing Company, Brooklyn, N. Y. Capital, $50,000. Incorporators: Eugene F. Bannigan, Peter J. Kane, and Matthew V. O'Malley. The company operates a tool and grinding room, and stamping, plating, polishing, japanning and lacquering departments.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

A Model Foundry.—Catalog No. 125 has just been issued by the Whiting Foundry Equipment Company, Harvey, Ill. The book consists of thirty-six pages and gives complete descriptions and illustrations of complete foundry plants for the manufacture of all kinds of metal castings. The catalog is well worth the perusal of anyone interested in foundry work and can be had upon request.

Norton Refractories.—A handsome little catalog illustrative of the line of Norton Refractories, including Alundum and Crystolon grinding and cutting compounds, India oil stones, and grinding machinery, has been issued by the Cleveland Tool and Supply Company, Cleveland, Ohio. The line of these refractories is very extensive and is thoroughly described and illustrated in the catalog which may be had upon request.

Aeron System.—Booklet "J" has been issued by the De Vilbiss Manufactuirng Company, Toledo, Ohio. The Aeron System of finishing makes possible the application of varnishes, enamels and lacquers on any kind of finishing material on wood and metal products with compressed air. The booklet contains full descriptions and illustrations of the Aeron systems manufactured by this company and copies may be had upon request.

Rhotanium.—Herman A. Holz, 50 Church street, New York, N. Y., has issued a leaflet describing Rhotanium, which is a patented rare metal alloy claimed to possess the same qualities as platinum, but is superior to platinum in its resistance to wear in laboratory use. Rhotanium was demonstrated for the first time at the convention of Chemical Industries, held at the Grand Central Palace, New York, N. Y., the week of September 25.

Fuel Oil Appliances.—The W. S. Rockwell Company, furnace engineers and contractors, 50 Church street, New York, N. Y., has issued Bulletin No. 31. This bulletin is devoted to the Rockwell line of oil and gas burners, fuel oil pumps, blowers and oil handling machinery in general. The bulletin attempts to give, without prejudice, some of the fundamental principles which govern the handling and burning of fuel oil. Copies may be had upon request.

Oil Filters.—Bulletin N. 5, "Oil Filter," recently issued by the Richardson-Phenix Company, Milwaukee, Wisconsin, describes a complete line of filters for purifying lubricating oil, having capacities of from 25 gallons per day to 50,000 gallons per hour. This is said to be the most complete oil filter catalog ever issued and describes some exceedingly interesting large size filters for use in purifying lubricating oil from water wheel thrust bearings, large gas and steam engines in steel mills and also for purifying cutting lubricants.

Drinking Water Systems is the title of a very interesting pamphlet recently issued by the Armstrong Cork and Insulation Company, of Pittsburgh, Pa. Complete descriptions of the drinking water systems that are being rapidly installed by this company in factories throughout the United States are given. The Armstrong company constructs these systems by means of their Nonpareil cork covering, the use of which insures the automatic regulation of the temperature of the drinking water. Copies of this interesting catalog will be sent upon request.

Tobin Bronze.—The American Brass Company, Ansonia Brass and Copper Branch, Ansonia, Conn., has issued a very interesting booklet of thirty-five pages that is devoted to Tobin bronze. A full description of the applications of this metal is given together with tables of weights and measures involving Tobin bronze and photographs of yachts, whose parts are made of this material. Tobin bronze is stated, by the company, to be a composition of copper, zinc and tin; the exact mixture of which they do not publish, but that it is within the limits of the United States Government specification to which they work regularly. Copies of this booklet may be had upon request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REPORT

COPPER.

NEW YORK, October 2, 1916.

The one important feature to note in the copper market during the month of September was the sale to the British Government for account of the Allies of 200,000 long tons of electrolytic copper on September 23 for delivery over the first six months of 1917. This order calls for 75,000,000 pounds to be shipped each month from January to June, 1917. With the increased refinery capacity contracted for the coming year this order will take about one-third of the total production of the country. The price of this sale has not been announced, but it is understood to have been around 26 cents. This order has been talked about and exploited since about last June and on the strength of this prospective order, home consumers have come into the market at different times when negotiations were reported as pending and prices have been advanced 3 to 4 cents per pound. After the high prices that were ruling around March and April last of 29 and 30 cents, the price of 26 cents seems fairly reasonable.

The astonishing part of the whole transaction is that now that the sale has actually gone through the consuming trade of this country seem to be entirely indifferent as to the effect of the sale on the future of the market.

Consumers have been so often scared with so many reports of "Big Foreign Business" pending that they are all pretty well covered for their requirements probably well into 1917. Consumers have been buying very freely all the month and now with the foreign buying over we may have a dull period again. Prices are fairly firm, but the large producers are still doing about the same prices as before the large export sale was made. December is offered at 28 cents, delivered, terms; first quarter at 27 cents and first half at 26½ to 27 cents. Lake copper is scarce at 28¼ to 28½, and casting firm at 26½ to 26¾ cents.

The exports for the month will be close to 30,000 tons.

TIN.

The tin prices have held very steady throughout the month and the fluctuations have been within one cent per pound, due to the fact that there have been no speculation in London and no active trading in this market. Consumers have been eager buyers and some of the tin plate makers have covered their requirements for some months ahead at around present prices. There has been a good demand and prices show very little change from a month ago. Tin opened at 38⅞ and closed at around 39⅜ cents. Futures are offered at from ¼ to ½ cent lower for December-January deliveries.

LEAD.

The lead market has been fairly strong, and prices have been advanced ½ cent per pound during the month, from 6.50 the trust price New York basis at the opening to 7 cents per pound on the 19th of the month. The demand has been good and some large sales were made for Canada account. Towards the close of the market the market became firmer and some of the independents advanced prices ¼ cent per pound above the trust price of 7 cents, this may bring an advance by the trust in a few days. Price today, 7 to 7¼ cents New York basis.

SPELTER.

The spelter market has been very dull and prices show very little change. Some days prices started to advance on a little buying, but later eased off again. Price today is around 9¼ cents for prompt New York and futures about ½ cent per pound lower.

ANTIMONY.

The antimony market has been dull and easier and prices are nearly 2 cents per pound lower than a month ago. Today the price is down to close to 11 cents for Chinese-Japanese and this price from 1½ to 2 cents below the importer's price. Futures are freely offered at lower prices.

ALUMINUM.

The aluminum market holds very firm due probably to the steady demand for export to England. There is very little virgin aluminum offering and prices range from 60 to 63 cents per pound. Sheets are offered at from 80 to 85 cents per pound for delivery in about six weeks.

SILVER.

The silver market has held very steady at from 68 New York to 68⅞ at the close.

QUICKSILVER.

The quicksilver market has been rather easier again and prices have been down to $72 per flask. Today the leading interest is quoting $75 per flask, but dealers are shading this price.

PLATINUM.

The platinum market has been firmer and the price asked today is $87 an ounce against $60 a month ago.

SHEET METALS.

Sheet metal prices are all more or less nominal. Sheet copper is quoted at 37½ cents f.o.b. mill for hot rolled and 38½ cents for cold rolled. Copper wire prompt is quoted at 33 cents and last quarter at 32 to 32¼ cents f.o.b. mill. High sheet brass, 42 to 46 cents; tubing, 45 to 50 cents.

OLD METALS.

The old metal market has been fairly active and prices all hold firm. There has been a good demand for brass scrap and prices are firm.—J. J. A.

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

Lake Copper. 1915—Average for year, 18.94. 1916—January, 24.75. February, 27.75. March, 28. April, 29. May, 29⅞. June, 28.25. July, 27.25. August, 27. September, 28.

Brass Mill Spelter. 1915—Average for year, 17.50. 1916—January, 22.25. February, 22.75. March, 23.15. April, 23.20. May, 21.20. June, 17.40. July, 15.20. August, 13.60. September, 13.70.

AUGUST MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Closing.
Lake	28.50	27.25	28.50
Electrolytic	28.50	27.50	28.50
Casting	26.50	25.00	26.50
TIN	39.40	38.30	39.40
LEAD	7.00	6.50	7.00
SPELTER	9.50	8.70	9.25
ANTIMONY (Chinese and Jap)	13.00	11.25	11.25
SILVER	68⅞	67¼	68.90

Metal Prices, October 2, 1916

NEW METALS.	Price per lb. Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER. Manufactured 5 per centum.	
Lake, carload lots, nominal	28.50
Electrolytic, carload lots	28.50
Casting, carload lots	26.50
TIN—Duty Free.	
Straits of Malacca, carload lots	39.37½
LEAD—Duty Pig, Bars and Old 25%; pipe and sheets 20%. Pig lead, carload lots	7.00
SPELTER—Duty 15%.	
Brass Special	10.00
Prime Western, carload lots, nominal	9.25
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½ per lb.	
Small lots, f. o. b. factory	70.00
100-lb. lots f. o. b. factory	66.00
Ton lots, f. o. b. factory	63.00
ANTIMONY—Duty 10%.	
Cookson's cask lots, nominal	....
Hallett's cask lots, nominal	....
American	Nominal
Chinese, Japanese	11.25
Wah Chang WCC, brand spot	11.25
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad valorem.	
Shot, Placquettes, Ingots, Blocks	45.00
ELECTROLYTIC—5 cents per pound extra.	
MANGANESE METAL	Nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	4.00
BISMUTH—Duty free	4.50
CADMIUM—Duty free nominal	1.80
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty, 10% per flask of 75 pounds	75.00
GOLD—Duty free, per ounce	$20.67
PLATINUM—Duty free, per ounce	87.00
SILVER—Government assay—Duty free, per ounce	68⅞

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	39 to 41
Silicon Copper, 20% ..... " "	39 to 42
Silicon Copper, 30% guaranteed " "	42 to 43
Phosphor Copper, guaranteed 15% " "	39 to 41
Phosphor Copper, guaranteed 10% " "	35 to 39
Manganese Copper, 30%, 2% Iron " "	48 to 53
Phosphor Tin, guaranteed 5% " "	55 to 60
Phosphor Tin, no guarantee.. " "	45 to 47
Brass Ingot, Yellow..... " "	17 to 19
Brass Ingot, Red..... " "	22 to 24
Bronze Ingot ..... " "	22 to 24
Parsons Manganese Bronze Ingots " "	28½ to 30
Manganese Bronze Castings " "	28 to 37
Manganese Bronze Ingots... " "	23 to 27
Phosphor Bronze ..... " "	24 to 26
Casting Aluminum Alloys... " "	50 to 51

PHOSPHORUS—Duty free.	
According to quantity	35 to 40

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
21.75 to 22.25	Heavy Cut Copper	25.00 to 25.50
20.50 to 21.50	Copper Wire	23.00 to 24.50
18.00 to 18.50	Light Copper	21.50 to 22.50
17.00 to 17.50	Heavy Mach. Comp	19.00 to 19.50
12.50 to 13.00	Heavy Brass	14.00 to 15.00
10.00 to 10.25	Light Brass	11.50 to 12.50
13.75 to 14.25	No. 1 Yellow Brass Turnings	14.50 to 15.25
14.25 to 15.00	No. 1 Comp. Turnings	15.00 to 16.00
5.00 to 5.50	Heavy Lead	5.75 to 6.00
6.50 to 7.00	Zinc Scrap	7.00 to 7.75
18.00 to 20.00	Scrap Aluminum Turnings	19.50 to 21.00
30.00 to 31.00	Scrap Aluminum, cast alloyed	32.00 to 34.00
40.00 to 42.00	Scrap Aluminum, sheet (new)	45.00 to 47.00
23.00 to 24.00	No. 1 Pewter	25.00 to 28.00
26.00 to 28.00	Old Nickel	30.00 to 32.00
19.00 to 21.00	Old Nickel anodes	22.00 to 24.00

PRICES OF SHEET COPPER.

Mill shipments (hot rolled) ..... 37½c. base net
From stock ..... 39c. base net

Width.	SIZE OF SHEETS. LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill..15.00 cent basis, less 8%	
Casks, jobbers' prices	17
Open casks, jobbers' prices	[illegible]

Metal Prices, October 2, 1916

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect May 10, 1916.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.40	$0.41	$0.42
Wire	.40	.41	.42
Rod	.40	.42	.43
Brazed tubing	.45	—	.47
Open seam tubing	.45	—	.47
Angles and channels	.45	—	.47

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.42	$0.43	$0.44
Wire	.42	.43	.44
Rod	.42	.44	.45
Brazed tubing	.47	—	.49
Open seam tubing	.47	—	.49
Angles and channels	.47	—	.49

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

31½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	38c.	per lb. base
100 lbs. to 300 lbs. in one order	38½c.	" " "
Less than 100 lbs. in one order	40c.	" " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, — per lb.
Seamless Copper Tubing, — per lb.

For other sizes see Manufacturers' List.

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛ ¼ ⅜ ½ ¾ 1 1¼ 1½ 2 2½ 3 3½ 4 4½ 5 6

Due to fluctuations of the metal market we are unable to quote these prices.

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch		
½ inch		
⅝ inch		
¾ inch		
⅞ inch		
1 inch		
1⅛ inch		
1¼ inch		
1½ inch		
1⅝ inch		
2 inch		

Due to fluctuations of the metal market we are unable to quote these prices.

PRICES FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	42c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	38c.	" "
Muntz or Yellow Metal Rectangular sheets other than sheathing	43c.	" "
Muntz or Yellow Metal Rod	39½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 58c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 7c. over Pig Tin. 50 to 100 lbs. 8c. over, 25 to 50 lbs. 9c. over, less than 25 lbs. 15c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Base price, 60c.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30			
	3-30			
21 to 24 inclusive	30-48			
	48-60			
25 to 26	3-30			
	30-48			
27	3-30			
	30-48			
28	3-30			
	30-48			
29	3-30			
	30-48			
30	3-30			

We are unable to quote these prices, but they can be had upon application to manufacturers and dealers.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters.

Stubs' Gauge. Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ in.	3 ins.	3½ ins.	4 ins.	4½ ins.
11. .120.																	
12. .109.																	
14. .083.																	
16. .065.																	
18. .049.																	
20. .035.																	
21. .032.																	
22. .028.																	
24. .022.																	

We are unable to quote these prices, but they can be had on application to manufacturers and dealers.

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

We are unable to quote these prices.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	44c.	16%	48c.
8%	45½c.	18%	48½c.
10%	46c.	20%	51c.
12%	47c.	25%	60c.
15%	47½c.	30%	66c.

GERMAN SILVER WIRE.

Quality	Net per lb.	Quality.	Net per lb.
5%	47c.	15%	53¾c.
8%	49c.	16%	54¼c.
10%	50½c.	18%	56¼c.
12%	52¼c.	30%	71½c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.